# V. Darjeeling tea, India

by

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## Abstract:

India enacted its Geographical Indication of Goods (Registration and Protection) Act in 1999 in compliance with Article 24 of the TRIPs Agreement in order to protect indications connected with geographical origin. More than 100 products are currently registered under the act, including Darjeeling tea, which was the country's first GI product.

The quality, reputation and characteristics of Darjeeling tea are essentially attributable to its geographical origin. As a result of a favourable geo-agro-climatic situation, specific soil characteristics, plantation conditions, traditional human practices and a skilled local workforce, it possesses a specific flavour and a very high quality, distinguishing it from tea grown elsewhere in the world. Darjeeling tea is grown in the region of the Darjeeling hills in 87 gardens at various elevations up to 2 000 metres. The GI production area has been clearly defined by the Tea Board of India.

Darjeeling tea benefits from a world-wide reputation and has no problem over market access. The entire production is sold every year, mainly for export. The main objective of all the actors in the supply chain, including the Tea Board of India and the Government of India, is to protect the name "Darjeeling", which has been misused in various ways in various countries. The name, reputation and logo of this tea are now protected by various legal tools (certification mark, collective mark, geographical indication etc.), depending on the institutional context of each country. Despite these efforts, misappropriation of the name is still harming its market potential. Collective action, with greater involvement of all supply chain stakeholders, is advisable in order to increase the positive economic and social impact of GI registration at the local level.

# Introduction

Darjeeling is a small district in the extreme north of India's West Bengal State in the Himalayan foothills. Darjeeling tea is famous and popular throughout the world for its high quality, with a reputation based on its aroma, brightness and taste – all attributable to its geographical origin and impossible to replicate. In 2004, Darjeeling tea became the first product in India to be registered under the Geographical Indications of Goods (Registration and Protection) Act of 1999 (hereafter referred to as the GI Act).

## 1. Institutional context

India is one of the founder members of the World Trade Organization (WTO) and one of the signatories of the General Agreement on Tariffs and Trade (GATT) negotiations (Uruguay round), of which the Trade-Related Aspects of Intellectual Property Rights (TRIPs) Agreement is a part. Section 3 of the TRIPs Agreement contains three articles concerning geographical indications (GIs): Article 22 provides for the protection of GIs and Article 23 for additional protection for GIs for wines and spirits, while Article 24 is concerned with international negotiations and exceptions – all articles of immense importance to India in this context. India joined with various other countries in calling for the same protection for other products as that envisaged for wines and spirits in the TRIPs Agreement.

India enacted its GI Act in 1999 and formulated its Geographical Indications of Goods (Registration and Protection) Rules in 2002 for the protection of goods in the domestic market. The act came into force in September 2003.

The main objective of the Indian Government is to develop the production of GI products, leading to increased trade through the creation of new markets for these products. The second objective is to provide a legal framework to protect both products and consumers from fake, false or reproduction products, thereby ensuring fair competition and promoting rural development.

In India, the Ministry of Commerce and Industry, the Ministry of Agriculture and Patent and Regional Centres are in charge of GIs. The legal framework applies mainly to agricultural products, processed products, and wines and spirits. Protection is primarily provided by provisions in the 1999 Trademarks Act and the 1999 GI Act. The tools of identification and protection are a collective or certified trademark with geographical indication, appellation or designation of origin, a protected geographical indication, a general quality sign linked to particular area(s), and a sign relating to a general quality linked to a specific country or region of production.

The GI Act stipulates that an application for GI registration should contain:

- a statement as to how the GI serves to designate the goods as originating from the area in question;
- the class of goods to which the GI shall apply;
- a map of the area in which the goods originate or are manufactured;
- particulars regarding the appearance of the GI logo, whether it is comprised of words or figurative elements or both;
- a statement of such particulars by the producers of the concerned goods.

More than 100 products have so far been registered in India under the GI Act, but Darjeeling tea was the first. The Tea Board of India is the owner of the Darjeeling tea registered quality sign, while the producers, processors, traders, blenders, packers, brokers, exporters etc. in the supply chain are its users. The Tea Board has prepared and now enforces specific rules and regulations concerning use of the quality sign and its labelling by stakeholders.

# 2. Geographical zone and specific resources

## General context

### *Location*

Darjeeling is a small town in the Himalayan foothills, lying at an altitude of 2 130 metres above sea level and known as the Queen of the Hills. It is located in Darjeeling District in the extreme north of West Bengal State in the east of India. The district extends from tropical plains at about 91 metres above sea level to an altitude of 3 658 metres on the Sandakfu-Phalut ridge.

The strategic location of Darjeeling is very important, bordering Sikkim to the north, Bhutan to the east and Nepal to the west, thus forming an international and inter-state border area.

### *Population*

According to the most recent census (2001), the population of the district was 1.6 million, with 33 percent living in the three hill towns of Darjeeling, Kurseong (1 482 metres above sea level) and Kalimpong (1 249 metres above sea level). Darjeeling town has an additional average floating tourist population of 20 500 to 30 000. The population density of the town is 10 173 per square kilometre. The literacy rate in the district is 81 percent for men and 64 percent for women.

### *Economy and agriculture*

The two main economic activities in the region, generating the most employment and revenue, are tea manufacturing and tourism. However, tourism is confined to several tourism spots and is seasonal (from April to June and from September to October): tourists prefer to avoid the area in the rainy season because of frequent landslides. The economic benefits of tourism reach only a small proportion of the population.

Tea is thus more important than tourism. It is the main crop in the region and is grown over a vast area of hilly land, covering 17 542 hectares divided into 87 estates. After the first 3 commercial tea estates were established at Tukvar in 1852, the area under tea expanded gradually to 39 estates in 1866, 56 in 1870 and 113 in 1874. Today there are 87 tea plantations in and around Darjeeling town, producing superfine Darjeeling tea. The average yield is very low – 400 to 450 kilograms per hectare, compared with the national average of 1 800 kilograms per hectare. (Between 20 000 and 21 000 two-leaves-and-one-bud shoots weigh 1 kilogram.)

◀ *Two leaves – one bud of Darjeeling Tea*

The tea estates are located on hilly terrain at various altitudes, covering hundreds of hectares. The tea-growing zone has reached saturation point and there is little scope for further expansion. Other cash crops grown in non-tea hilly areas include potatoes, oranges, cardamom, ginger, maize and various vegetables. Small quantities of certain medicinal plants are also grown, while floriculture is expanding in some non-tea areas. Farming on terraced slopes is a major source of livelihood for rural inhabitants, supplying neighbouring towns with fruit and vegetables.

### *Ownership patterns*

All the tea estates are permanently owned by the West Bengal State Government, which leases the land to the growers on a fixed-rent basis for a minimum of 30 years and a maximum of 99 years, renewable after expiry of the lease. These leases can be transferred or sold.

### *Workers and social welfare*

Traditional tea cultivation on steep, hilly terrain has brought economic betterment and well-being through improvement in the local inhabitants' employment situation. The majority of employees on Darjeeling's tea estates are women. An average of more than 700 people are employed permanently on each estate, receiving half their pay in cash (Rs 62.50 per day per worker) and half in kind, in the form of free accommodation (bedroom, kitchen and toilet with free water supply), subsidized cereal rations (Rs 0.47 per kilogram of rice or wheat), free made tea and free medical benefits for all members of their families. In addition, producers build and maintain primary school buildings for free education, provide free crèche facilities with free milk for workers' babies and children, pay festival and other allowances, and supply umbrellas, blankets and shoes in various seasons, firewood for daily use and lime for whitewashing houses each year. Some estates also provide small farmers in the estate area with farm implements to grow such crops as ginger, cardamom, turmeric and oranges, and hives to promote beekeeping. An infants' nutrition programme has also been introduced by building cowsheds and providing workers with cows free of charge. Sports and inter-village cultural competitions are organized to promote cultural activities, especially among young people and children. Religious sites such as old temples, monasteries and churches are renovated for the convenience of local devotees.

Almost 60 to 70 percent of the estates' total expenditure is accounted for by workers' wages and welfare measures. Fringe benefits are provided under the provisions of the Indian Plantation Labour Act, while wages, bonuses and annual increments are determined by collective bargaining through tripartite meetings each year within the framework of the same act.

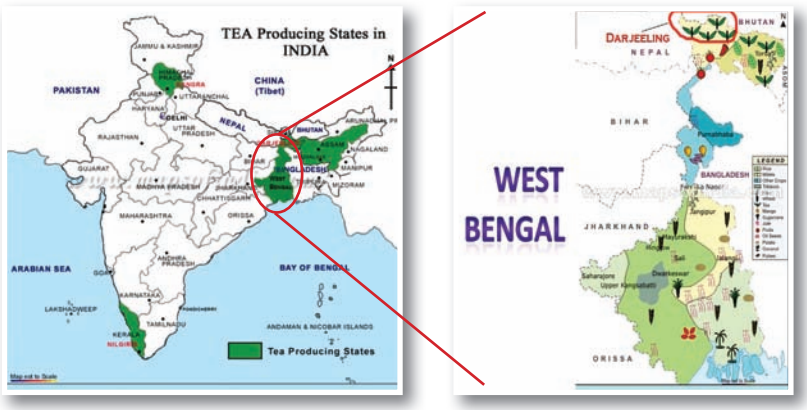
## Delimitation of the zone

***Administrative boundaries***

The entire tea-growing zone – 17 542 hectares spread over 87 tea estates – is under the administrative jurisdiction of Darjeeling District. The estates are located in three subdivisions of the district – Sadar, Kurseong and Kalimpong – under the provincial administration of the West Bengal State Government.

The Tea Board of India defines Darjeeling tea as follows:
Tea which has been cultivated, grown, produced, manufactured and processed in tea gardens:

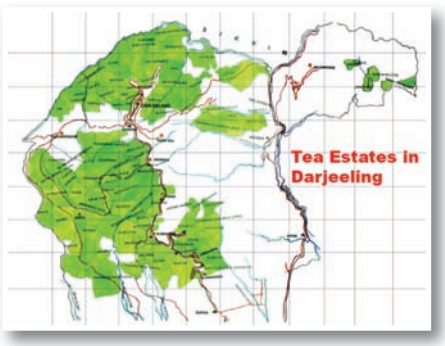
- in the hilly areas of Sadar Subdivision,
- only in the hilly areas of Kalimpong Subdivision comprising Samabeong Tea Estate, Ambiok Tea Estate, Mission Hill Tea Estate, and Kumai Tea Estate and Kurseong Subdivision excluding the areas in jurisdiction list 20, 21, 23, 24, 29, 31, and 33 comprising Subtiguri Subdivision of New Chumta Tea Estate, Simulbari and Marionbari Tea Estate of Kurseong Police station,
- in Kurseong Subdivision of Darjeeling District.




***Geographical boundaries***

The demarcated area is the hilly part of Darjeeling District.

The Tea Board of India has identified 87 tea estates and demarcated their boundaries.




***Darjeeling notified tea estates.***


***Darjeeling delimited tea zone***

Each estate in the delimited tea zone has its own factory, as required under the definition of Darjeeling tea provided by the Tea Board:

> Tea which has been cultivated, grown, produced, manufactured and processed in tea gardens in the hilly areas ... of the district of Darjeeling in the State of West Bengal, India. Tea which has been processed and manufactured in a factory located in the aforesaid area, which, when brewed, has a distinctive, naturally occurring aroma and taste with light tea liquor and the infused leaf of which has a distinctive fragrance.

Leaves from the few tea estates that do not have their own factories are processed on neighbouring estates. The leaves have to be delivered to the factory for weighing and withering immediately after picking, because the tender two-leaves-and-one-bud shoots are easily perishable. Otherwise the quality of the picked leaves may deteriorate, affecting the final quality of the made tea. The factory must therefore be located in the production area, either on the estate or nearby. For obvious reasons, the production and processing zones must therefore be identical.

## Specific resources

***A suitable zone for quality tea production***

The Darjeeling tea zone benefits from suitable terrain and environmental conditions for the cultivation of tea, where it has been grown continuously since 1835. The tea estates are all located in seven valleys at altitudes ranging from 200 metres to more than 2 000 metres above sea level. The gradient of the slopes is very steep – 60º to 70º. The very high rainfall spread over various months is a boon for tea cultivation. Rainfall, humidity, evaporation rate, wind speed, hours of sunshine, mist, cloud and fog are also important factors in developing the unique quality of Darjeeling tea.

In terms of soil, the average carbon level of soil in Indian tea-growing areas other than Darjeeling is less than 1 percent, while it is much higher in the Darjeeling area.

The physical characteristics of the tea estates are summarized in Table 1.

***Table 1: Physical characteristics of Darjeeling tea estates***

| | |
|---|---|
| Altitude | 200 metres to more than 2 000 metres above sea level |
| Latitude | 26º31' to 27º13' north |
| Longitude | 87º59' to 88º53' east |
| Rainfall | Average annual rainfall ranging from 1 700 to 2 500 millimetres |
| Humidity | Very high, with fog, mist and occasional snow |
| Soil | Rich and loamy: in the uplands it is usually red, gritty and residual, i.e. derived from the weathering of underlying rocks and rich in organic matter from the surrounding forest cover |
| Slope | Gradient of 60º to 70º: these steep slopes provide natural drainage for the generous rainfall received in the seasonal monsoons |
| Temperature | 1 ºC to 11 ºC with a maximum of 20 ºC |
| Sunshine | Average of 2 to 4 hours per day |
| Tea-growing areas | Seven valleys, facing the Himalayas |

*Tea estate in Darjeeling area*

### *History and culture*

Darjeeling started as a hill station 175 years ago in 1835 and was a tea distribution centre with only 20 families in 1839. Seeds of *Camellia sinensis* var. *sinensis* were brought from Kumeon, and as a result of successful cultivation in the area, nurseries were established by the British Government in 1847. The number of tea estates and the size of the area under tea gradually increased over the years.

The name Darjeeling is believed to be derived from two Tibetan words, *dorje* meaning "thunderbolt" and *ling* meaning "place" or "land", which, in combination, mean "the thunderbolt land".[1]

### *A specific tea variety*

One of the specific features of Darjeeling tea is that the bushes grown here belong to the small-leaved Chinese variety, *Camellia sinensis* var. *sinensis*, and not to the large-leaved Assam variety, *Camellia sinensis* var. assamica. This Chinese hybrid is found almost nowhere in the world outside China and Japan, except for Darjeeling and the Caucasus. It is easily identifiable because of its smaller leaves. Its roots are more than 1 metre long, which is helpful for soil conservation, and it can withstand a cold climate.

*Tea bush*

*Tea flower*

### *Traditional know-how*

Tea has now been cultivated in the area for a long time, so that there are skilled people, know-how and traditions. Jobs on tea estates are handed down within families, so that such work becomes a traditional family profession.

More than 70 percent of the workers are women, engaged mainly in tea picking, which is highly specialized work and requires a great deal of care. The women workers consider tea bushes extremely sensitive and perform the job very efficiently. The technique is a

[1] Legend has it that the thunderbolt of Lord Indra (King of Heaven in Hindu mythology) fell at the place where the Ob servatory Hill now stands. The name, however, could bear some reference to climatic elements, inasmuch as higher areas and hilltops are very often covered with cloud, mist and fog, with frequent thunderstorms.

traditional skill handed down from generation to generation. The picking of two-leaves-and-one-bud shoots has to be followed here, unlike other tea-growing areas in India.

***Women picking Darjeeling tea***

***Concept of terroir***

The concept of *terroir* is applicable to Darjeeling. *Terroir* – a delimited geographical area with specific soil and climatic conditions, combined with the traditional production practices and know-how of local inhabitants – differentiates Darjeeling's hilly areas from other tea-growing areas in India and elsewhere in the world. Altitude, intermittent cloud and sunshine, soil characteristics, temperature, rainfall, fog, mist, moisture and wind, combined with the human factors (know-how and culture) and the use of Chinese hybrid tea bushes: all these factors contribute to make Darjeeling tea a unique and inimitable product.

The quality, reputation and characteristics of Darjeeling tea are essentially attributable to its geographical origin. It possesses a flavour and quality that distinguish it from tea grown anywhere else in the world, giving it the stature of a fine wine and winning it the patronage and recognition of discerning consumers worldwide for more than a century. Any member of the trade or public ordering or purchasing Darjeeling tea expects the tea to have been cultivated, grown and produced in a well-defined hilly region in Darjeeling District and to have the special characteristics associated with such tea (Tea Board of India).

## Constraints and other issues in the zone

***High production costs***

The slopes of Darjeeling's tea estates are so steep that ploughing can be done only manually, thereby increasing production costs. The hilly terrain also increases input costs: higher procurement costs for workers' rations, maintenance of supply lines, higher fuel costs, frequent power cuts, high costs for transporting the picked leaves from the plantation to the factory, then for transporting the made tea from the processing site in the hills to warehouses in Kolkata.

The low yields of Darjeeling tea compared to yields in other parts of India is another important factor contributing to high costs. The average Darjeeling yield per hectare is very low – 400 to 450 kilograms, compared with the national average of 1 800 kilograms.

Moreover, during the unproductive four months of winter from November to February, the idle workforce is still paid, which is a heavy burden on estate owners.

Taking all these factors into account, production costs at estate level (according to estate sources) amount to Rs 200 to 225 per kilogram. In addition, Rs 100 to 125 per kilogram is spent on administrative costs, including the payment of various taxes.

***Lack of infrastructure***

Poor infrastructure, such as roads and bridges, results in a loss of workdays and a deterioration in the quality of the tea. The transportation of goods is highly time-consuming and costly because of the poor condition of the narrow roads due to lack of maintenance. Furthermore, weight restrictions on traffic on the hilly roads – for example, vehicles with loads of more than 5 tons are not allowed to use the hilly roads of the Darjeeling area – represent another impediment to the cost-effectiveness of the tea industry.

***Climate change***

The vagaries of nature caused by global warming may in due course bring sustained monsoons and heavier rainfall, leading to considerable losses for the estates. Rainfall has already become irregular and the distribution pattern has also changed, but with no reduction in quantity; indeed, rainfall has increased and is now concentrated in six to seven instead of eleven months. As a result, irrigation water is not available throughout the year and even drinking water has become scarce. The erratic rainfall pattern causes frequent landslides in the hilly terrain, causing huge damage and heavy losses to the estates. When a landslide occurs in a particular area, workers are wary of working there during heavy rains for fear of further landslides, so that a great deal of valuable picking time is lost in the process.

***Lack of land for expansion, or a reduction in land for tea cultivation***

Additional land is rarely available for expansion or the establishment of new plantations, inasmuch as available land beyond tea estates is forest cover. Restrictions on the expansion of the area under tea are mainly a result of topographical factors, irrigation problems, lack of an economy of large-scale production and a prohibition on forest clearing. Moreover, during agitation for a separate state, when many tea estates were closed for indefinite periods, some plantation workers took advantage of the situation, unlawfully and forcibly occupying a portion of land on each estate. If this forcibly occupied land is liberated, it could significantly increase the tea area. However, no initiative is being taken in this regard. Moreover, natural disasters and frequent landslides are seriously affecting tea estates, causing a shrinkage in area.

***Environmental issues***

The steepness of the slopes has made the area very prone to environmental hazards in the form of regular soil erosion and occasional landslides. Soil fertility is reduced as a result of the erosion of topsoil, while the massive use of chemical fertilizers and pesticides in the past has reduced topsoil quality and fertility, further affecting the overall natural and environmental condition of the area.

Moreover, the population growth rate is very high, and Darjeeling and the surrounding area face deforestation as a result of the increasing demand for fuelwood and timber to

build houses. Deforestation has led to desertification, causing serious environmental problems, which are further aggravated by the air pollution caused by increasing vehicular traffic.

# 3. The product and its specific quality

## Product specific quality

The specific quality of Darjeeling tea is linked particularly to the first two levels of production – the fields and the processing unit. The main factors affecting the specific quality are thus:

- genetic features of tea bushes of the Chinese variety *Camellia sinensis* var. sinensis;
- environmental factors: altitude, gradient, climatic conditions and soil composition: owing to the specific natural conditions described above, the metabolic (photosynthetic) rate of Darjeeling tea bushes is much lower than that of any other tea bushes grown elsewhere; this stunts the growth of the leaves and increases the concentration of the natural chemical elements that are mainly responsible for the specific quality of Darjeeling tea (Tea Board of India);
- agronomic factors: farm management, tea picking technique (two-leaves-and-one-bud shoots), application of various types of fertilizer and pesticide (organic and/or chemical);
- factory practices: processing conditions, techniques and machinery at all levels from withering to tasting, sorting and grading;
- marketing factors: packaging for the prevention of moisture absorption, storage in good conditions, transporting with proper covering and due care etc.

The other actors in the supply chain (traders, auctioneers, exporters, blenders and packers) affect the specific quality of the product to a lesser degree (mainly through the quality of storage and transportation facilities).

◀ ***Made tea leaves***

***Taste and appearance***

The specific qualities of Darjeeling tea lie in its physical appearance and taste, giving the following characteristics:

- *stylishness:* a neat, well twisted, even sized, wiry leaf appearance;
- *tippy appearance:* the unopened buds on the tea bush are turned into silvery particles called tips, which give the made tea an attractive appearance;
- *bloom:* a silken sheen on the tea – greyish green in the spring flush, purplish brown in summer and blackish brown in the autumn flush;
- *brightness:* a lively colour with a hue varying from delicate lime green in the spring flush to bright copper purple in the second flush and pale brown in autumn;
- *nose point:* the fragrance exuded by the infused leaf – the aroma or bouquet – can be evocative of certain flowers or fruit, or have a muscatel character;
- *evenness:* uniformity of colour and size of the infused leaf.

The specific qualities of the infused tea are:

- *colour:* varying from pale lemon to rich amber according to the season; cups are said to have varying degrees of visual brightness, depth and body;
- *flavour:* a fragrance and a complex, pleasing taste and aftertaste with attributes of aroma, bouquet and point;
- *taste:* mellow, smooth, round, delicate, mature, sweet, lively, dry, brisk etc.


◀ ***Various colours of liquor***

For made tea, quality identification and assessment are carried out through an organoleptic procedure of tasting – a subjective but highly expert job. Tea and wine are indeed the only two products for which the quality is judged through organoleptic evaluation.

***Reputation***

Darjeeling tea is a unique product of international fame, sometimes known as the champagne of teas. Its excellent reputation is associated with its world-famous aroma and unique cup characteristics. The Tea Board of India defines Darjeeling tea as follows:

> *Tea produced in the said [Darjeeling hilly] region has the distinctive and naturally occurring organoleptic characteristics of taste, aroma and mouth feel which have won the patronage and recognition of discerning consumers all over the world.*
> *(Geographical Indication Journal,* 1, July 2004)

It is a unique product and has been famous throughout the world for more than a century. There is therefore no need to reinforce its reputation, although the marketing strategy does require periodic updating in order to retain consumers' loyalty through appropriate market promotion.

Local stakeholders have been very conscious of the reputation, specific qualities and uniqueness of Darjeeling tea from the early days and have thus optimized their product.

***Consumer perception***

At least 70 percent of the Darjeeling tea produced is exported to international markets (see Table 4 below), so that most of its consumers are overseas. No market studies for Darjeeling tea have so far been carried out either within the country among domestic consumers or abroad among overseas consumers.

However, in the course of the present study, a pilot market study was undertaken among a small group of consumers of Darjeeling tea in and around the city of Kolkata[2] in order to measure the importance of reputation to consumers.

The survey found that Darjeeling tea is much appreciated on the domestic market. Historically, it has had a very positive image because of its excellent quality, reputation and characteristics. Its consumers belong to a higher segment of society in terms of social

[2] pilot study on consumer behaviour was conducted in July-August 2009 in Kolkata and surrounding areas. The sam ples encompassed both male and female respondents belonging to various sectors of society, age groups, professions and localities.

status, culture and financial resources. The majority of consumers use "fannings", "brokens" and "mixed tea", and few use pure leaves. Most buyers purchase tea in loose form and have no problem over paying higher prices for Darjeeling tea.

Tea is drunk between one and four times a day. Consumers derive major satisfaction from the cup qualities of Darjeeling tea: 32 percent of domestic consumers have a very high appreciation of Darjeeling tea, 56 percent a high appreciation and 12 percent a moderate appreciation. Domestic consumers at present pay prices 25 to 300 percent higher than for Assam or Dooars tea, and 92 percent of consumers are ready to pay higher prices for Darjeeling tea to satisfy their preference.

It is interesting to note that most consumers are unfamiliar with the GI logo or the GI process and are convinced only by the name Darjeeling, the retail shop and the seller. Most have trust in the seller or shop where they regularly purchase Darjeeling tea. None of them bothers, however, to verify the GI logo when buying loose or packaged tea from known shops. They simply purchase it in good faith and on the basis of the image of the shop and seller.

## Product specifications: requirements for GI registration

***Description of the sign obtained***

Darjeeling tea is a very high-quality product and has become the flag-bearer of Indian tea abroad. In order to identify its extraordinary qualities, it has been linked to a quality sign by creating a logo that indicates and confirms its origin and quality, and protects it from the manipulation, contamination and misrepresentation practised by many dishonest traders worldwide.


***Some classic instances of misuse/abuse of the Darjeeling logo and name***
***Source: Darjeeling Tea Association***

The Darjeeling logo and the name Darjeeling have been registered twice by the Tea Board of India under the GI Act – as certification mark and as GI. The aim is to prevent misuse of the name Darjeeling for tea that is sold worldwide, thereby protecting consumers by ensuring that they receive the genuine product (100 percent Darjeeling tea) and enabling the commercial benefit of the brand to reach the whole supply chain, including plantation workers. The Tea Board of India and the Darjeeling Planters' Association developed this logo a long time ago.

The Logo is described by the Tea Board of India as **-a stylized representation of an Indian woman holding tea leaves in a roundel. The woman design element has a stylized circular ear ring and a nose stud. The word mark "Darjeeling" skirts the left portion of the roundel. All these elements blend together to constitute the Darjeeling logo** [TBI].

### *GI requirements*

Darjeeling tea stakeholders have to meet the following requirements in order to be legitimate users of the Darjeeling tea GI:

- Each stakeholder in the supply chain must be licensed by the Tea Board of India through a mandatory contract. On the basis of this contract, the Tea Board can take action against any infringement of regulations.
- Each producer must have a certificate of origin from the Tea Board. In order to obtain this certificate, he or she must comply with all the required criteria – production zone, quality of final product, competence, processing method as described in the standard operating procedures etc. The certificate of origin is delivered only after verification of compliance with all the requirements. (More details in this regard are given in the subsection "Certification and control devices" below.)
- Each producer must have his or her own growing unit (estate or garden) within the defined region of Darjeeling, along with a processing unit within the same region (close to the plantation).
- The product must be manufactured in accordance with provisions laid down in the Prevention of Food Adulteration Act. It must satisfy the required quality and safety tests, which are important components in obtaining the certificate of origin. The hazard analysis and critical control points (HACCP) certification process ensures the safety of the product, while ISO 22000 is concerned with hygienic factory conditions.
- No tea of any origin other than the delimited Darjeeling tea zone may be sold under the name Darjeeling and no blend of Darjeeling tea with tea of non-Darjeeling origin is permissible.
- The tea produced and sold must undergo an organoleptic evaluation process by expert tea tasters who are competent to evaluate it on behalf of the proprietor of the GI, i.e. the Tea Board of India.
- Exporters of Darjeeling tea must collect the certificate of origin from the Tea Board of India.

### *Standard operating procedures*

Basic rules of production for the entire Darjeeling tea zone are laid down in the standard operating procedures, which are subscribed to by all Darjeeling tea producers and manufacturers. These rules concern cultivation (good agricultural practices) and processing (good manufacturing practices) and are intended to ensure and maintain the quality of Darjeeling made tea.

The manual of standard operating procedures includes all the procedures that are implemented and monitored in order to produce a guaranteed quality of Darjeeling tea. It is the basis for the control points regarding production and processing. Observation of all these practices ensures that traditions and specific features, including food safety and quality, are maintained. Every worker is actively involved and aware of the standard operating procedures of orthodox[3] Darjeeling tea, so that preventive or corrective action can be taken whenever any deviation is noted.

[3] Orthodox tea refers to either hand-processed tea or tea that is rolled with machinery in a manner that mimics hand-rolling. Most specialty tea and all whole-leaf tea are made with orthodox production methods. The opposite of orthodox tea is CTC tea (crush, tear, curl), which is machine-processed in a way that chops the leaves into uniformly-sized bits that are typically used for low-grade teabags. Orthodox tea is generally known for being more nuanced and complex than CTC tea.

The following paragraphs present a synthesis of the main steps in the production and manufacture of Darjeeling tea, as found in the standard operating procedures manual.

*Transportation.* After picking, the leaves are taken to the estate factory by van, jeep or tractor-trolley, or (on a very few estates) along ropewalks. Green leaf transportation is a very important factor in the quality and aroma of the tea. If there is any delay in transporting the leaves from the picking or weighing point, some portion of the flavour is lost. The fresher the leaves, the higher the quality and aroma will be, so that the transportation time from garden to factory should be as short as possible.

***Ropeway***

Once the green leaves reach the factory, they undergo various processes for conversion into "made tea" according to the "orthodox manufacturing art" of processing as evolved through traditional practice over time.

*Withering.* In this phase, the green leaves are spread evenly in wooden troughs, where they are withered to remove 60 to 65 percent of their moisture, either by atmospheric cold air or by artificial dry air created by heating the natural air with a coal-fire heater and blowing it over the leaves in a regulated manner for a period of 14 to 18 hours.

***Leaves on withering troughs***


*Rolling.* Next, the withered leaves are taken for weighing and then loaded into cast-iron rollers for mechanical processing. The purpose of rolling is twofold: first, physical – to twist the leaf to obtain the desired grade; and, second, chemical – to rupture the cells in order to speed up fermentation so that enzymes can act as catalysts in achieving the most prized flavour and colour. This process takes between 20 and 65 minutes depending on the quality of the leaves, the season, atmospheric conditions etc. The control point here is that the leaves should not be over-heated; otherwise the quality of the tea will deteriorate. The heat is measured by feeling it with the hand.

*Sifting.* In this process, properly unrolled leaves are sorted through sifters for a second roll lasting for another 15 to 20 minutes, mainly for the second leaf of the shoot, which is a little larger and coarser.

*Fermentation.* When rolling is over, the twisted and ruptured leaves are spread on long concrete platforms or the floor in a cool, humid room in very thin layers for a length of time ranging from less than 1 to a maximum of 4 hours, depending on various climatic and physical factors, in order to achieve the required quality. The purpose is to extract the flavour from the ruptured leaves. This phase, also called oxidation, is the natural process whereby a unique flavour, aroma and colour are developed. It is the most critical point in

the manufacture of tea, inasmuch as various characteristics of Darjeeling tea depend on this particular phase. During the process, flavour, aroma and other characteristics are achieved. In hot weather, the fermenting time decreases, whereas in cold, moist weather it increases. During this stage, the leaves are constantly checked by sniffing in order to avoid under- or over-fermentation. If under-fermented, the colour will be brownish and the tea will be brittle. If over-fermented, the colour will be black, the sheen will be lost and the leaves will become flat without any specific quality. Another very important point is that no outside smell should enter the factory in order to protect the original aroma of the tea.

***Fermentation of Darjeeling Tea*** ▶

*Drying.* When the desired smell is achieved in the fermentation stage, the leaves are sent for drying. The drying process starts in order to stop enzymatic mellowing by pushing the leaves through dryers and reducing the moisture by 2 to 3 percent. The dryer temperature is kept at 110 ºC to 115 ºC and run-through time is roughly 23 minutes, differing from dryer to dryer depending on the altitude and the estate. The control point here is that the difference between the drying inlet and outlet temperatures should be 32 ºC.

*Sorting.* Dried leaves are sorted into grades with the help of sifters with various sized meshes. Leaf size and volume are very important in grading. A larger leaf corresponds to a higher grade.

*Storing.* After sorting and grading, tea has to be stored in bins for a certain period. However, tea is hygroscopic and may absorb moisture during such storage. Before final packaging, moisture therefore has to be reduced to the right level through a process known as gapping. This is carried out with a special dryer with a low inlet temperature known as a dehumidifier. Tea is then finally packed for dispatch from the factory.

*Packing.* After grading, the sorted tea is packed into specially designed moisture-repellent foil-lined packages. A moisture meter is used to test the moisture level of made tea before packing. The standard required minimum moisture level in made tea is 3 percent. A higher level will cause a loss of quality and aroma, while a lower level will impart the capacity to retain aroma and quality for longer. There are therefore two requirements here: speedy transportation of made tea from estate factory to warehouse, and packaging material developed in such a way as to be moisture-repellent (innovation required) or at least to prevent moisture from penetrating the pack and affecting the tea. Moreover, there is the possibility of grade-breakage due to over- or under-packing in paper sacks, and this can lead to a loss in cup quality, colour etc.

*Dispatching.* Tea packages are then dispatched from factory to warehouse in Matador vans or small trucks in the hilly region as far as Siliguri, from where they are transported to Kolkata in large trucks. Improper loading and faulty covering may cause breakage or moisture damage, leading to a decline in cup quality. It is therefore vital to avoid over- or under-loading and to ensure that waterproof material is used to cover the load.

***Food safety aspects***

The processing of tea in all Darjeeling factories is subject to various sanitary and hygienic certification systems, ensuring that the tea is certified and guaranteed as safe for consumption in accordance with the provisions of the Prevention of Food Adulteration Act. The production norms of the Sanitizing Standard Operating System are observed on the tea estates for the production of tea under good hygienic and sanitary conditions. The HACCP certification process (compulsory for Darjeeling tea) ensures that the product is safe for consumption – a necessary criterion for all food processing. ISO 22000 (with compulsory observation) certifies hygienic factory conditions under the quality assurance scheme.

***Links with other quality schemes and labels***

Darjeeling tea packages may also bear other labels, such as "certified organic tea", "fair-trade certified tea" or "environmentally friendly tea".

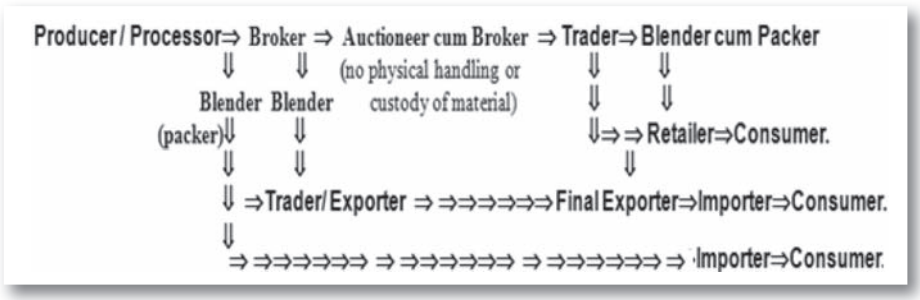
However, such labels are added as extra "feathers", enabling the product to fetch a higher price and meet customers' preferences. Darjeeling tea is linked to other quality assurance schemes, which are mutually complementary.

There are various accreditation agencies that certify Darjeeling tea to be organic, fair trade etc. They charge high certification fees after a lengthy process of investigation, verification and auditing at the estate level. Fair trade is certified by the Ethical Tea Sourcing Partnership, while environmental and ecofriendly aspects are certified by the Green Forest Alliance and organic tea is certified by various international agencies accredited by the Tea Board of India. However, all these types of certification are voluntary.

In Darjeeling, 35 percent of the estates have already received organic certification and 15 to 20 percent, perhaps more, are in the process of doing so. Moreover, on the remaining conventional estates, the use of chemicals, both fertilizers and pesticides, has been significantly reduced in accordance with good agricultural practices.

## 4. Stakeholders and the qualification process

The supply chain, from production to marketing – from primary producer to ultimate wholesale buyer, final exporter and first overseas handler – is illustrated in the diagram below.




As can be seen, there are three main distribution channels for orthodox Darjeeling tea from primary producer to consumer.

## Actors in the supply chain and collective organization

***Producers***

There are 87 estates of sizes ranging from 23.20 to 506 hectares according to a Tea Board of India source, and from 113 to 580 hectares according to the producers. The total area under tea is 19 500 hectares on the 87 estates, so that the average estate size is 224.14 hectares. The average production of each estate is approximately 136 300 kilograms of made tea according to the Tea Board of India.

Each estate is equipped with a processing unit or factory where green leaves undergo various stages of processing to prepare "made tea". There are various categories of worker from leaf-pickers to factory workers. The current workforce in the industry exceeds 55 000 people employed on the 87 estates on a regular basis, while a further 15 000 are employed on a casual basis for nine months during the tea picking season (from March to November) (see http://darjeelingnews.net/tea_facts.html). Table 2 gives a more detailed picture from 1991 to 2009 in this regard.

***Table 2: Estimated average number of permanent workers on Darjeeling tea estates from 1991 to 2009***

| Year | Number of workers | Share in % wrt 1999 | % fewer or more than 1999 |
|---|---|---|---|
| 1993 | 46 568 | 91.41 | - 8.59 |
| 1994 | 58 814 | 115.40 | + 15.40 |
| 1995 | 58 887 | 115.55 | + 15.55 |
| 1996 | 53 740 | 105.45 | + 5.45 |
| 1997 | 49 783 | 97.67 | - 2.33 |
| 1998 | 50 289 | 98.67 | - 1.33 |
| 1999 | 50 964 | 100.00 | 0.00 |
| 2000 | 51 515 | 101.08 | + 1.08 |
| 2001 | 51 938 | 101.91 | + 1.91 |
| 2002 | 52 671 | 103.35 | + 3.35 |
| 2003 | 52 547 | 103.11 | + 3.11 |
| 2004 | 53 363 | 104.71 | + 4.71 |
| 2005 | 53 412 | 104.80 | + 4.80 |
| 2006 | 53 492 | 104.96 | + 4.96 |
| 2007 | 54 202 | 106.35 | + 6.35 |
| 2008 | 55 000 | 107.92 | + 7.92 |
| 2009 | 61 397 | 120.47 | +20.47 |

*Source: Tea Board of India up to 2008; estimated for 2009 on the basis of the Report of the Committee on the Competitiveness of Indian Tea [Government of India, 2009]*

There are three categories of producer and enterprise that lease tea estates within the defined tea zone in Darjeeling District:

- proprietors-cum-partnership houses (registered under the Company Law and controlled and managed by the individual owner or partners, directly involved with micro-level management);

- public-sector undertakings (controlled and managed by the government under the Department of Public Enterprise, with no role in micro-level management being played by the head of the company);
- corporate (registered as private corporations under the Company Law, controlled and managed by a board of directors, with officers deputed for micro-level management, and the chairman or managing director playing a role at policy level only).

***Processors***

Producers are often also processors, with cultivation and processing carried out by the same producer. There is a processing unit or factory on 72 of the 87 estates, while the remaining 15 have their leaves processed by arrangement with a neighbouring estate within the specified Darjeeling tea zone.

They can also purchase leaves from other estates located within the delimited Darjeeling tea zone, processing them in their own unit. However, the processing unit is not independent of the estate. The manager of a tea estate is the person who supervises tea cultivation on the estate and also tea processing in the processing unit under the name of the estate.

The other important function of processors is disposal of tea produced on the estate, using three distinct sales channels:

- direct export under forward contracts through personal contact;
- private sale from estate to third-party exporters for export and to domestic dealers;
- auction sale (confined to organizational tasks).

***Collective organization***

The Tea Board of India, under the Ministry of Commerce and Industry, is very much involved in various activities for the development and prosperity of Darjeeling tea. It was established in 1954 under the Tea Act of 1953, long before the quality process started.

Collective action was undertaken by producers through formation of the Darjeeling Planters' Association long ago to support development and benefit tea producers. This organization was then renamed the Darjeeling Tea Association (DTA), which is the collective organization of the supply chain stakeholders and is thus primarily an association of producers, processors, traders and exporters. The association has an elected executive council headed by a chairman. The secretary or principal officer looks after all matters pertaining to Darjeeling tea, including the execution of day-to-day work and regular contacts with the Tea Board of India. DTA has its head office in Kolkata and its only branch office in Darjeeling.

One major function of the Darjeeling branch office is to collect daily data from member estates on the quantity of leaves picked, processed and dispatched, and then pass this information on to the Kolkata office, which in turn delivers it to the Tea Board of India. On this basis, the Tea Board issues a certificate of origin to exporters and importers.

Efforts are being made to bring the few non-member producers under DTA's umbrella in order to strengthen any relatively weak points of the organization, such as estate-level collection of more accurate data by some specialized body. This would help to prevent the infiltration into the Darjeeling tea zone of leaves or made tea from any other area inside or outside the country. Member estates are prohibited from purchasing Nepal leaves or made tea.

DTA informs members of any developments concerning Darjeeling tea, such as legal provisions, agricultural operations, research findings, training courses, seminars, government grants, the market situation, GI prospects, matters pertaining to the Tea Board and developments on any specific estate. The association updates members on a regular basis by email and post, providing information on any of the above aspects.

DTA also actively participates, together with the State Labour Department and the Workers' Union, in tripartite meetings and negotiations to fix workers' wages, bonuses and gratuities. The association also intervenes in the case of any problem that arises between workers and the local estate management on any matter, trying to resolve it effectively.

DTA and the Tea Board work together for the collective generic promotion of Darjeeling tea.

## Objectives of the actors regarding GI registration

The basic objective of all the stakeholders in the supply chain is to share in the benefits of the quality sign. On this purpose, they have to comply with certain trade restrictions, especially the prohibition on blending non-Darjeeling tea with Darjeeling tea under the GI. Initially this has been considered a trade risk by the few traders and blenders in the Darjeeling tea supply chain who followed this practice before the regulations came into force. However, all the producers and the majority of the traders, brokers and exporters in the supply chain feel that the restrictions imposed by the Tea Board will protect Darjeeling tea on the domestic and international markets, and thereby protect their present and future interests.

The major objectives of the various actors in the supply chain are summarized below.

***Primary objectives***

- The first objective of all local stakeholders is that of protecting the name Darjeeling from misuse in various countries in various ways. Misappropriation of the name is a major problem. More than 20 years ago, Darjeeling tea producers claimed that

  > ... an estimated 40 to 50 million kilograms of tea is sold worldwide as 'Darjeeling tea' to credulous customers, when the actual exports of genuine Darjeeling tea from India are no more than 8 or 9 million kilograms! ... However, the output of Darjeeling tea has declined steadily over the past three decades, and the vacuum on the world market has been exploited by unscrupulous blenders in the West. They have happily passed off Kenyan or Sri Lankan tea as Darjeeling tea (Dasgupta, 1987).

- A major objective of traders, exporters, blenders, packers etc. is that of improving market access.
- An objective of all the stakeholders in the supply chain has been that of differentiating Darjeeling tea from other teas in order to increase its added value.
- An objective of producer-exporters and trader-exporters is that of escaping the adverse effects of fluctuations in the international market in order to achieve a strong, stable position on both domestic and international markets.
- An objective of both producers and the Government of India is now that of supporting a collective dynamic in favour of rural development. GI registration will protect the

product in the market, so that all the actors in the supply chain, especially producers, expect prices on the domestic and international markets to rise, since consumers will be receiving a genuine product. A significant share of the increased price will come to producers, while the government will receive increased revenue. The increases may bring about rural development in three ways: a sizeable amount from the producers' extra sales income will be spent directly on workers' welfare by undertaking suitable projects; a portion of this extra income could be spent by producers to pay workers in cash, in the form of enhanced wages, bonuses etc., thus increasing their purchasing power and their families' well-being; and the extra revenue the government earns from the increased price may allow it to spend more money for civic development of the estates and adjacent rural areas.

- An objective of producer-processors and the Tea Board (i.e. the Government of India) is that of maintaining the local population by providing employment and such other opportunities as civic, educational and medical facilities within the locality. It should be mentioned here that 70 percent of the total population of 1.6 million are directly or indirectly associated with the tea industry in various capacities.
- An objective of the Tea Board, producers and processors is that of facilitating the respect of various norms, such as those regarding labelling, sanitary standards, traceability and combating fraud.

***Secondary objectives***

- An objective of producers and processors in general is that of preserving biodiversity on the estates and in the general locality by protecting various animal species and endangered plant species, enhancing soil fermentation etc. There is a high international demand for organic products, for which purchasers pay a higher price, although national purchasers are less aware in this connection. In the Darjeeling delimited zone, 55 or 60 percent of estates have already converted to organic and biodynamic certified production or are in the process of doing so, while others are on the verge of starting the process. This conversion to organic and biodynamic production will preserve the biodiversity of the area. GI registration will thus have an indirect impact in terms of preserving and protecting biodiversity in Darjeeling, although the GI production rules do not intervene directly in the matter.
- An objective of all the actors in the supply chain is that of preventing biopiracy.
- An objective of producers, processors, the Tea Board and exporters has become that of preserving the traditional know-how of Darjeeling tea manufacturing.
- An objective of local workers, producers and the government is that of preserving the local cultural heritage.

## History of the registration process

The process of promoting origin-linked quality came from producers and processors of Darjeeling tea through their collective organization (DTA), working jointly with the Tea Board of India. A core group was formed for registration and protection of the logo, including the name Darjeeling.

The Tea Board's attempt to protect Darjeeling tea dates back to 1986, several years before registration of Darjeeling tea in 2004 under the GI Act. However, the logo and the name were developed even earlier, in 1983, by the Darjeeling Planters' Association.

The board took the first steps to protect genuine Darjeeling tea from fakes within the country more than 20 years ago and was successful in obtaining "home protection" by registering the Darjeeling logo and name first as a certified trademark in 1986 under the Indian Trade and Certification Marks Act of 1958, and then as an artistic work under the Copyright Act of 1957. The Trade and Certification Marks Act was later replaced by the Trademarks Act of 1999. The Darjeeling logo and the name Darjeeling have therefore been registered as a certified trademark under the new act. Lastly, the logo and the name were registered as a GI mark under the GI Act of 1999.

The Tea Board has provided active support and cooperation to DTA in endeavouring to obtain legal protection in India and other countries. The Darjeeling logo has been legally accepted as a certified trademark in many countries, but Darjeeling tea has so far been recognized for protection as a GI product in very few countries. Applications have been filed with all the necessary documents in many countries, including those of the European Union, but they are still pending. Delays in granting protection are preventing eligible stakeholders from enjoying the benefits of GI registration.

In the initial stage, the stakeholders and their organization (DTA) had to depend on the Tea Board for the establishment and protection of the quality sign (through various procedures and mechanisms under the provisions of applicable laws and regulations). However, in the long run the Tea Board would prefer gradually to hand over responsibility to DTA. Producers are to have autonomy regarding production, inasmuch as they can decide everything in their own way. However, for the establishment and protection of the quality sign and for any kind of subsidy, they are to depend on the Tea Board. A large sum of money was involved in registration of the quality sign under the GI Act in India, and DTA did not have sufficient funds to pay for it, but had to depend on the Tea Board – and the situation is similar for registration of the quality sign in other countries.

## Support of stakeholders external to the supply chain

External support is considered immensely important to the stakeholders in the supply chain for improvement of the Darjeeling tea industry through the establishment of a quality sign. Such support may come from the public sector, for example the Tea Board of India, a development agency or a research institution.

### *Administrative support*

The Tea Board provides administrative guidance and advice as required, and also makes physical contributions when required through the introduction and implementation of various schemes in this connection.

### *Financial assistance*

Financial assistance in the form of term loans or subsidies is required for many purposes: replanting, rejuvenation, creation of irrigation facilities and drainage systems, purchase of vehicles, factory modernization, capacity augmentation, value addition, purchase of

cleaning machines for made tea, conversion to organic production, fees of certifying agencies etc. The Tea Board provides limited subsidies to stakeholders on various accounts.

***Integration into a network***

Support in this connection is considered important from the viewpoint of monitoring. Integration of all the stakeholders into a network is important for the industry as a whole for establishment of the quality sign and ensuring that it functions more effectively. Some kind of network integration is carried out by DTA, but international networking will also be required after global recognition of the GI. The services of the Organization for an International Geographical Indications Network (oriGIn) may be useful in establishing such links.

***Research and training***

Research on various aspects of tea cultivation, processing, packaging and marketing, including protection of the quality sign, are required by the stakeholders with a view to product and market development. The Tea Research Association and the Darjeeling Tea Research and Development Centre play important roles in this connection, undertaking scientific and technical research so as to provide producers with solid results.

Training is also provided in order to update the knowledge of staff and managers at estate level, through the joint organization – by DTA and the Darjeeling Tea Research and Development Centre – of seminars and training programmes.
In the training courses, field workers and staff of all levels are provided with training on such subjects as:

- working in harmony with nature (preserving biodiversity and the ecosystem);
- enhancing individual and group efficiency within the traditional cultivation system (estate operation);
- producing the best possible quality under the traditional manufacturing system (factory operation).

Training is carried out regularly by the Tea Board of India and DTA in collaboration with the Tea Research Association through the organization of workshops, training programmes, seminars and refresher courses on new technologies and quality development in order to meet the quality requirements of the world market. The Tea Research Association also publishes a quarterly bulletin covering every aspect of tea production and management, and the practices to be followed in the ensuing quarter. The bulletin is distributed to estate managers well in advance of each quarter to provide statistical and other relevant information regarding necessary action.

Such action is needed in order to obtain the best results from staff of every level – administrative, field, specialized etc. – through the adoption of new techniques and methods that have been developed through intensive research by the Tea Research Association, of which Darjeeling producers are members. Each member must pay an annual subscription, plus a pro rata contribution (approximately Rs 0.088 per kilogram) to fund research.

***Material contributions***

Material support is required for the establishment of new factories, machinery, factory certification, conversion to organic production etc. The Tea Board always takes the initiative in this respect, acting on behalf of the Ministry of Commerce and Industry. Contributions

are also received from the country's banking sector and such national and international development agencies as the National Bank for Agriculture and Rural Development and the International Development Agency.

## Problems and weaknesses in the qualification process

***Initial difficulties***

The Tea Board of India had to face various obstacles and difficulties regarding the registration process for the Darjeeling tea quality sign.

In the initial stage, when attempts were made to register a certified trademark under the Trade and Certification Marks Act of 1958 and the Trademarks Act of 1999, and again under the GI Act of 1999, the traders, packers, blenders and exporters were all reluctant to follow the regulations for trading in Darjeeling tea. The main reasons for their opposition were the prohibitions on passing off non-Darjeeling tea as Darjeeling tea, or on blending or mixing non-Darjeeling tea with Darjeeling tea, the requirement for a licence from the Tea Board etc. Even some of the large companies joined in the opposition. However, the resistance was cleared up through prolonged discussions and meetings with the reluctant stakeholders to explain the effectiveness of the system and the benefits they would derive from it. The larger companies that initially opposed the move now see it as beneficial to them and have therefore supported the registration process in their own interests.

***Exclusion of certain producers***

Producers and processors in the Darjeeling zone have very similar levels of mechanization, technical innovation etc., so that all the 87 estate-owners are able to follow the rules laid down in the standard operating procedures and comply with the requirements for obtaining a certificate of origin from the Tea Board. They are thus all part of the action programme within the Darjeeling tea zone.

Some international buyers have been included – together with producers, traders, brokers, auctioneers and exporters – in the action programme regarding the Darjeeling tea quality sign.

A few traders engaged in the retail trade in Darjeeling tea have not yet been brought into line with the GI Act. They are not members of DTA and are still reluctant to comply with all the GI requirements.

# 5. Effective protection of the GI

## GI registration to prevent misappropriation of the name

Collective action launched by DTA and the Tea Board of India is aimed specifically at protecting Darjeeling tea (see the subsection "History of the registration process" above). In the 1980s, the Tea Board was appraised of the seriousness of this problem. In order to protect consumers' interests in general and also to fetch a higher and fairer price for producers of world-reputed Darjeeling tea, it therefore decided to launch a massive awareness campaign in the United Kingdom. This campaign ran uninterruptedly for three years, with advertisements and popularization of a generic logo for Darjeeling tea by appointing the world-famous advertising agency Saatchi and Saatchi in 1988. At that time, GIs were not a generally familiar concept.

In the more than two decades since then, the GI concept has been introduced, the GI Law has been enacted, GI rules and regulations have been formulated, and Darjeeling tea has been registered as a GI product. Nevertheless, the problem of misuse and misbranding still exists. Mere registration of the quality sign under the appropriate law or act in a given country does not end the story. After registration, the quality sign has to be protected from piracy worldwide in accordance with the provisions of the law or act. It is a very hard task to operate as a watchdog all over the world, monitoring the conflicting marks that are found and taking appropriate action against misuse of the Darjeeling name and quality sign anywhere in the world. It also requires major expenditure and DTA is incapable of bearing such a load, so that it depends on the Tea Board. More than 100 cases of misuse have been identified, 75 percent of which have been settled through negotiation and 25 percent through a court sentence, all in favour of Darjeeling tea, while only one case is still pending settlement.

The costs involved in registering and protecting the quality sign are very high, which is why the Tea Board of India and not collective action on the part of the industry has been responsible for registration of Darjeeling tea under the GI Act in India. The Tea Board also pays the fees of the supervisory agency and the costs of any necessary legal action. The Government of India then compensates the board as part of its market promotion endeavours. The external support received from the Tea Board for the legal protection of the quality sign has been very important, and the board has to stay vigilant because misappropriation is frequent. It is still required to play a very significant role in this aspect of the quality sign process in order to obtain the greatest benefits for stakeholders and promote rural development.

## Certification and control devices

The effectiveness of protection also lies in the control and certification system, which ensures that the Darjeeling tea GI is used only by legitimate stakeholders who comply with GI requirements. The control and certification system also provides guarantees to consumers regarding the origin and quality of Darjeeling tea.

***Darjeeling certification practices***

Certification is carried out in two ways – either by a public body (the Tea Board), or by a third party or accredited agency:

- The genuineness and origin of Darjeeling tea is certified by the Tea Board through the issuance of a certificate of origin, which acts as a guarantee that the tea is cultivated and processed within the delimited geographical zone of Darjeeling.
- Other certificates regarding quality, food safety, organic or ecofriendly production etc. are issued by third-party agencies accredited (in the case of organic production) by the Tea Board by virtue of the authority vested in it by the Ministry of Commerce and Industry in 2001.

However, there is no third-party certification for the Darjeeling tea GI. The Tea Board works in collaboration with DTA to exercise direct control over the GI regulations formulated by the board. The stakeholders in the supply chain have to comply with the regulations and conditions in order to obtain a certificate of origin from the board:

- Tea must grow on one of the 87 tea estates identified by the Tea Board within the delimited Darjeeling tea zone.

- All tea estates must be registered with the Tea Board.
- Tea estates must follow the single set of agricultural practices (laid down in the standard operating procedures) that has been developed and used for more than 150 years to sustain the growth of shoots and maintain the bush heights required for traditional picking by hand.
- Each estate must have a processing unit or factory within the estate and picked green leaves must be processed in this factory. Tea estates lacking their own factory must have their leaves processed in the nearby factory of another estate within the delimited Darjeeling tea zone.
- The tea leaves must be processed by the traditional rolling method, in which human effort and traditional knowledge are involved at every stage, as laid down in the standard operating procedures.
- No estate shall purchase picked green leaves from any estate outside the delimited Darjeeling tea zone. The estates may, however, purchase leaves from any of the 87 estates located within the delimited zone.
- The drying, sorting, grading and packing of tea must take place only in estate factories within the notified tea estates.
- No tea grown outside the delimited Darjeeling tea zone shall qualify or be treated as Darjeeling tea. Darjeeling tea must not be blended with any other tea and no tea grown outside the Darjeeling tea zone shall be processed in any factory within the zone.
- When the tea is tested by expert tasters from the Tea Board, it has the distinctive and naturally occurring taste, aroma and mouth-feel typical of tea cultivated, grown and manufactured in the delimited Darjeeling zone.
- All sellers of Darjeeling tea must be registered with the Tea Board of India.
- All producers must submit daily reports to the Tea Board of India through DTA, listing all production figures (estate invoices), picking and manufacturing figures (field and factory records), figures for green leaves purchased or transferred and all sales information apart from auction sales (private sales records).

***The various stages of organoleptic tasting of Darjeeling tea on a tea estate.***

***Certification and control costs***

The Tea Board of India charges no additional fee for issuing the certificate of origin for Darjeeling tea. Producers and other actors in the supply chain simply have to be registered with the Tea Board against payment of a fixed amount (Rs 15 000 – approximately US$325). The registration must then be renewed each year by paying a small amount (Rs 500 – approximately US$10.75). The certificate of origin is the only guarantee required by buyers regarding the origin of Darjeeling tea. Since a certificate is very inexpensive, there is no

reason for free-riding and it is not worth any Darjeeling tea producer's while to try selling tea without one.

However, for the other certification systems (regarding food safety and such voluntary standards as organic production and fair trade), the costs appear to be a major problem, since they are high for all such labels or standards. The main drawback of the system is that there is no worldwide standardized food safety and food quality certification. A number of different norms are therefore maintained in order to cater to different countries, entailing inspection, examination and certification by a variety of agencies, which charge very high certification fees. Different countries have different preferences regarding certifying agencies. Each estate thus has to obtain several certificates from several agencies for the same purpose, incurring major expenditure.

## 6. Markets

There is currently no problem of market access for Darjeeling tea. All the tea produced each year has a ready market, which means that its position is strong and stable.

### Overview of Darjeeling tea production

In the delimited zone, tea is cultivated on 87 estates on 17 542 hectares of hilly terrain out of a total grant area of 34 800 hectares. The provisional estimate for production of made tea in 2008 was 11 586 000 kilograms. Yearly figures since 1991 are given in Table 3 below.

According to DTA, the average annual production of Darjeeling tea is 10 million kilograms.

***Table 3: Tea estates, area, production and average yield of Darjeeling tea, 1991–2008***

| Year | Number of tea estates | Area under production (ha) | Total production (thousand kg) | Average yield (kg per ha) |
|---|---|---|---|---|
| 1991 | 102 | 20 085 | 13 932 | 694 |
| 1992 | 102 | 19 309 | 12 355 | 640 |
| 1993 | 102 | 19 324 | 13 026 | 674 |
| 1994 | 88 | 19 280 | 11 092 | 575 |
| 1995 | 83 | 18 932 | 11 298 | 597 |
| 1996 | 80 | 17 551 | 10 614 | 605 |
| 1997 | 80 | 17 760 | 10 054 | 566 |
| 1998 | 85 | 17 830 | 10 253 | 575 |
| 1999 | 85 | 17 604 | 8 653 | 492 |
| 2000 | 85 | 17 228 | 9 281 | 539 |
| 2001 | 85 | 17 453 | 9 841 | 564 |
| 2002 | 85 | 17 463 | 9 180 | 526 |
| 2003 | 85 | 17 580 | 9 582 | 545 |
| 2004 | 85 | 17 522 | 10 065 | 574 |
| 2005 | 85 | 17 539 | 11 312 | 645 |
| 2006 | 85 | 17 542 | 10 854 | 619 |
| 2007 | 85 | 17 818 | 10 007 | 562 |
| 2008 | 85 | 17 818 | 11 586 | 650 |

*Source: Tea Board of India*

### *Growth*

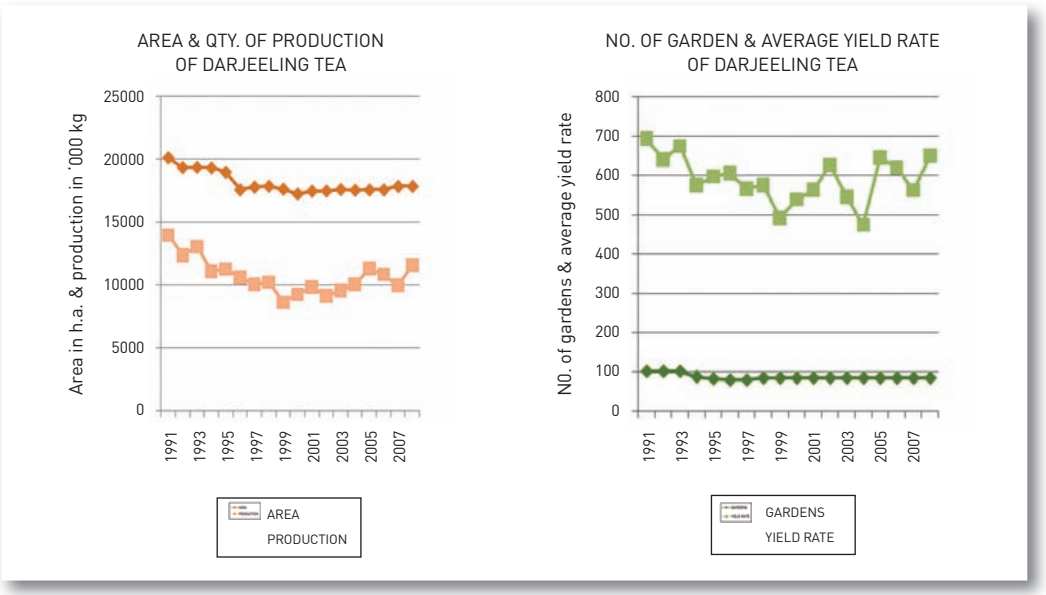
The growth of tea estates, area, production and yields over the past 20 years is shown in the graphs below.

- As can be seen, the number of tea estates in the delimited Darjeeling tea zone fluctuated in the early and mid-1990s but has been stable since 1998.
- The tea zone also shows mixed trends, declining from 1991 to 1996, then fluctuating until 2008, but showing a slow rising trend.

The Tea Board estimates that the area under tea has declined by nearly 3 000 hectares and production by 3 million kilograms over the past ten years. The reasons for reductions from 1991 levels are identified as poor labour management, entrepreneurial indifference, injudicious use of funds, lack of technical know-how etc. (*Status paper on tea*). The situation was aggravated by a prolonged, violent political campaign in the 1980s, in which many tea estates were closed and workers took advantage of the situation to occupy some tea land by force. The same type of political movement has been relaunched recently, again causing serious production and revenue loss to producers, satisfaction loss to purchasers and utility loss to consumers. If this situation continues for very long, it could pose a serious threat to implementation of the GI process.

On the other hand, the quantity of production and yields declined steadily from 1991 to 1999, but increased from 2000 to 2008. The stability of estates and the increase in area, production and average yields since 1999 are indicators of the good health of the Darjeeling tea sector. The reason for the positive growth may be attributed to GI implementation.

***Figure 1: Evolution of the area, quantity of production, number of estates and average yield rate of Darjeeling tea (between 1991 and 2008).***



## Types of market, current and aspired to

The main problem with Darjeeling tea is that it is still sold as a commodity and not a product. As a commodity, it is sold in bulk in large packs directly or at auction. Darjeeling tea has been classified as a speciality tea because of its inherent high value, so that it has found outlets in gourmet shops, especially in western countries. To obtain the best possible price, it needs to be sold in smaller packets.

The sale of Darjeeling tea in smaller packets and its promotion in western countries require large-scale expenditure, but the non-availability of the necessary funds has been a major constraint to successful marketing with a view to obtaining the best possible price. Moreover, there is still a problem in establishing consumers' preference for estate-packed packets of Darjeeling tea.

***Local market***

A high-quality, high-value product such as Darjeeling tea is not consumed by consumers in local rural markets within the country for many reasons. First, Darjeeling tea liquor is very light in colour, and rural inhabitants tend to prefer a hard black tea liquor, such as Assam black tea, after a hard day's work. Second, rural inhabitants' income is too low for them to afford the high price of Darjeeling tea. Third, Assam black tea and other teas are available in the local rural markets of West Bengal, so that there is no problem in obtaining people's preferred brand at a low price in rural areas. Local markets are thus not the proper outlets for such a sophisticated product as Darjeeling tea, and no effort is therefore made to develop local markets for Darjeeling tea on behalf of the producers, traders, public body (the Tea Board) or collective body (DTA). However, the workers, officers and managers of the estate and factory are given made tea (a fixed quantity per head) for their own consumption.

***Domestic market***

The profile of domestic consumers indicates that most of them reside in the metropolitan city of Kolkata. At the national level, metro-cities are therefore considered potential markets for Darjeeling tea, depending on various criteria – on the one hand, the consumers' economic condition, cultural background, taste preference, habit and social status, and, on the other, easy availability in retail outlets. Efforts are thus being made to develop metro-markets for Darjeeling tea.

***International market***

Darjeeling tea production is mainly export-oriented, with 70 percent being exported (see Table 4 below) to 43 countries. Efforts are being made to develop markets in many countries where Darjeeling tea is not yet being sold, and also to explore new markets in countries where it is already being sold. To this end, the Tea Board of India and DTA are organizing product exposure at trade fairs, exhibitions, seminars etc.

***Table 4: Quantity of Darjeeling tea produced and exported from 2004 to 2008***

| Year | Total production (kg) | Quantity exported (kg) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Total share | | Total no. of countries |
| | | Pure | (%) | Blended | (%) | Quantity | (%) | |
| 2004 | 10 065 000 | 3 767 194 | 37.13 | 3 278 306 | 32.57 | 7 045 500 | 70.00 | 35 |
| 2005 | 9 634 364 | 4 144 382 | 43.00 | 2 599 603 | 27.98 | 6 743 985 | 70.00 | 40 |
| 2006 | 9 770 929 | 4 340 416 | 44.42 | 2 499 234 | 25.58 | 6 839 650 | 70.00 | 39 |
| 2007 | 8 813 113 | 4 445 349 | 50.44 | 1 723 830 | 19.56 | 6 169 179 | 70.00 | 40 |
| 2008 | 9 487 793 | 3 814 371 | 40.20 | 2 840 316 | 29.94 | 6 654 687 | 70.14 | 43 |
| Total | 47 771 199 | 20 511 712 | 42.94 | 12 941 289 | 27.10 | 33 453 001 | 70.04 | |

*Source: DTA*

In 2005, the Government of India declared the Darjeeling tea-growing zone an agri-export zone. The number of export destination of Darjeeling tea rose from 35 countries in 2004 to 43 countries in 2008 after GI registration, including France, Germany, Iran, Japan, the Netherlands, the United Arab Emirates, the United Kingdom and the United States. In 2008, exports were being made to 12 new destinations – Armenia, Bulgaria, Croatia, the Czech Republic, Estonia, Greece, Kazakhstan, Latvia, the Russian Federation, the Seychelles, Ukraine and countries of the former Yugoslav Republic – although exports to Finland, Kuwait, Malaysia and Mauritius had stopped.

Once Darjeeling tea has been established and recognized as a GI product on the international market, customers' satisfaction and acceptance of the authentic "origin" of Darjeeling tea will be enhanced in increasing numbers of countries, so that the international market will expand. This expansion will put pressure on producers to increase production and improve quality through greater investment in production, processing units, research and development etc.

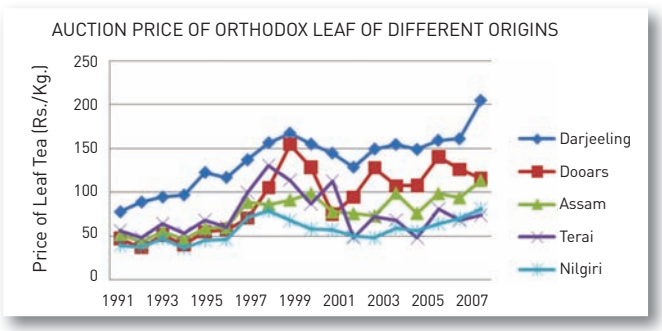
### *Competition*

The trade faces domestic competition from Assam and international competition from Nepal, Sri Lanka, China, Kenya, Indonesia and Vietnam.

### *Price*

The auction price of Darjeeling leaf tea saw a steady upward movement between 1991 and 1999, then a downward movement between 2000 and 2002, but again increased significantly over the years to 2009.

***Figure 2: Auction price of orthodox leaf tea of various origins in India***



## Distribution and trade

There are two modes of disposal of Darjeeling tea or two ways of physical access to domestic and international markets: auction (in bulk in Kolkata); and private sale directly from the estate to the merchant exporter or direct export by the producer to the customer.

### *Auction sale*

A sizeable quantity is sold through auctions held every Monday in Kolkata by J. Thomas & Co., attended by brokers and traders. As can be seen from Table 5, an average of half of total production is sold through auction. The table gives details of auction sales from 1991 to 2008.

***Table 5: Share of direct sale and auction sale of Darjeeling tea since 1991 (before and after GI registration)***

| Year | Auction sale | | Direct sale | |
|---|---|---|---|---|
| | Quantity (Tonnes) | Share (%) | Quantity (Tonnes) | Share (%) |
| 1991 | 6 139 | 44.06 | 7 793 | 55.94 |
| 1992 | 7 616 | 61.64 | 4 739 | 38.36 |
| 1993 | 6 365 | 48.86 | 6 661 | 51.14 |
| 1994 | 6 604 | 59.54 | 4 488 | 40.46 |
| 1995 | 5 537 | 49.00 | 5 761 | 51.00 |
| 1996 | 6 084 | 56.98 | 4 530 | 43.02 |
| 1997 | 5 879 | 58.47 | 4 175 | 41.53 |
| 1998 | 5 135 | 50.08 | 5 118 | 49.92 |
| 1999 | 5 260 | 60.79 | 3 393 | 39.21 |
| 2000 | 5 206 | 56.09 | 4 075 | 43.91 |
| 2001 | 4 651 | 47.26 | 5 190 | 52.74 |
| 2002 | 5 244 | 57.12 | 3 936 | 42.88 |
| 2003 | 5 295 | 55.26 | 4 287 | 44.74 |
| 2004 | 5 543 | 55.07 | 4 522 | 44.93 |
| 2005 | 5 527 | 48.86 | 5 785 | 51.14 |
| 2006 | 6 108 | 56.27 | 4 746 | 43.73 |
| 2007 | 5 461 | 54.57 | 4 546 | 45.43 |
| 2008 | 5 401 | 46.61 | 6 185 | 53.39 |

### *Direct sale*

Many producers prefer to sell directly to large buyers on domestic and international markets by establishing a personal relationship with them. The buyers come to the estate to observe the cultivation and manufacturing processes, verifying hygienic and other aspects, and checking production, manufacturing and hygiene certificates. If they are fully satisfied, they make contracts to purchase tea. Bulk quantities are sold directly, as can be seen from Table 5. Many producers nowadays prefer to sell directly, avoiding auction on both domestic and international markets, but this requires their involvement and investment in marketing activities, such as exhibition on supermarket shelves, demonstrations and even the linking of marketing to tourism and overseas communities.

### *Advantages and disadvantages of direct and auction sales*

*Advantages and disadvantages of direct sale.* The sale of Darjeeling tea through direct contact with both domestic and international buyers, bypassing auctions, is known in tea circles as the "unique selling proposition". The main advantage here is that the name Darjeeling arouses interest among buyers. Each tea estate has individual tea buyers familiar with it. The fame and image of the estates are associated with the buyer's perception, which is what makes the direct sale method successful. The strengths of the direct marketing system are that the mark-up is minimized, the level of buyer confidence is higher and a larger proportion of the final market price goes to the producer – a part of which can be used for workers' welfare. The only disadvantage of direct sale is that not everybody can carry out direct marketing through personal contact, while production quantities are much lower than world demand, so that not all buyers can be satisfied.

*Advantages and disadvantages of auction sale.* The advantage of the auction system is that it is a confirmed, traditional, systematic disposal method, in which producers have an assured outlet for their product without any extra trouble or any changes in the system. Bulk quantities of Darjeeling tea are therefore still sold through auction. Many producers who lack a good individual marketing network prefer auction sale in order to dispose of their product. For them, sale at auction to both domestic and international buyers is therefore easier and safer. The disadvantage of the auction system is that the very high mark-up between auction price and retail price means that producers receive a smaller proportion of the final market price and therefore have less money for workers' welfare. Many producers selling their produce at auction find that they receive only a small proportion of the price paid by end consumers. Ferguson (2002) estimates that producers receive only 32 to 37 percent of the consumer price, while the average mark-up between auction price and retail price is 192 percent. In the case of auction sale, the lion's share of the consumer price thus goes to non-producers in the value chain.

### *Business relationship*

Business relationships in the supply chain are maintained through direct interfaces with buyers, particularly those with establishments on estates. Meetings between buyers and sellers are organized, and buyers are invited to visit the estate, at which time producers extend all possible hospitality. All decisions regarding marketing are taken here – a type of one-on-one marketing. Contracts are normally signed for one year, but occasionally for longer.

Alliances with other organizations are also formed in order to obtain better prices, for example links with such international organizations as the Ethical Tea Sourcing Partnership and the Rainforest Alliance.

Trade is very secret and very competitive. The Tea Board of India also helps to organize buyer-seller meetings, both within the country and abroad, so that marketing policy can be formulated and decisions reached. Nobody knows about the discussions and decisions at these meetings.

### *Distribution of value*

It is the producer-processor who decides on the definition of the product, quality and grade on the basis of established traditional norms, with the assistance of tea tasters. Decisions

regarding the price of raw materials, for example green leaves, are taken by the estate manager on behalf of and in consultation with the producer.

Prices and margins are formed along the supply chain by the participants in each link through mutual agreement. In the process of price determination, the final point buyers are the price-makers, while the first point sellers, i.e. the producers, are the price-takers. The marketing decision is taken by the producer. Other rules regarding the distribution of value along the chain concern compliance with GI requirements for direct export and the obtaining of an export licence from the Government of India.

# 7. Impact of registration under the GI Act

## Stakeholders' perception

In terms of the primary objectives described in the subsection "Objectives of the actors regarding GI registration" above, stakeholders are to a large extent satisfied over the fulfilment of certain objectives, although there is also dissatisfaction over the non-fulfilment of others.

The first objective was that of *protecting the name Darjeeling from misuse in various countries in various ways.* It was expected that prevention of the misuse of the name would protect the original product – Darjeeling tea – by placing legal barriers to the entry of fake or false "Darjeeling tea" onto the market, so that the market would receive 100 percent genuine Darjeeling tea cultivated and manufactured within the delimited zone. In fact, however, the protection of the name is a never-ending task, requiring constant surveillance and considerable financial outlay. However, the ambitious verdicts of the Court of Appeal in France in the Dusong case and the Trademark Trial and Appellate Board in the United States in the Darjeeling Nouveau case in favour of the Tea Board of India made the board more optimistic, inasmuch as its success in these cases could send a strong message to improper users of the name, discouraging them from such misuse in the future. As a result, greater awareness concerning the quality sign has been created within the trade (including international trade) and some large-scale packers are now following GI norms and complying with quality sign requirements. Stakeholders have observed this success of the Tea Board with satisfaction.

The second objective was that of *improving market access,* and stakeholders could see this as another success of the quality sign process. The improvement in market access has been reflected to a certain extent in events: during the period from 1999/2000 to 2005/06, when the entire Indian tea industry suffered a recession, leading to severe price falls and a reduced demand for tea, Darjeeling tea showed little of these negative effects. Since 2002, the average auction price of Darjeeling orthodox leaf tea has seen a regular upward movement – from Rs 128.52 per kilogram in 2002 to Rs 205.00 in 2008. The highest average price in 2009 was Rs 229.18, reported by J. Thomas & Co. of Kolkata. The Darjeeling tea GI may have helped to protect it and be responsible for the increase in average price each year since 2002 – as was not the case for tea grown elsewhere in India (see Figure 2 above, giving auction prices).

The third initial objective of the stakeholders – *differentiating Darjeeling tea from other teas in order to increase its added value* – has thus been fulfilled to some degree of stakeholders' satisfaction.

Darjeeling tea has achieved the fourth objective of the stakeholders, that of *escaping the adverse effects of fluctuations in the international market in order to achieve a strong, stable position on the domestic and international markets,* partly by making more direct exports through forward contracts, but also by making personal contact with buyers, leading to better prices and better brand imaging than is the case with export through merchants.

Another objective that has been fulfilled through the quality sign process is that of *supporting the local population by providing employment and other opportunities such as civic, educational and medical facilities within the locality.* Out of a total population of 1.6 million in the Darjeeling hills (Census of India, 2001), roughly 1.12 million, or 70 percent, are directly or indirectly associated with the tea industry, while between 45 and 60 percent of total industry expenditure goes on workers and their benefits. The objective of keeping the population within the locality has also been successfully met.

*Secondary objectives.* The four secondary objectives (see Section 4, "Stakeholders and the qualification process" above) – to preserve biodiversity on estates and in the locality by protecting various animal species and endangered plant and insect species, enhancing soil fermentation possibilities etc.; to prevent biopiracy; to preserve the traditional know-how of Darjeeling tea manufacturing; and to preserve the local cultural heritage – should be achieved along with fulfilment of the primary objectives and the conversion of conventional estates to organic production. It is important to note that 55 to 60 percent, or perhaps more, of the estates in Darjeeling are already organic or in the process of conversion. The present traditional method of cultivation and manufacture, using age-old bushes, preserves traditional know-how and the local cultural heritage. Details are given in the subsections "Culture and tradition" and "Environmental impact" below.

***Limitations***

However, the stakeholders feel there have been some failures in the quality sign process.

- The lack of change in the price situation on the international market and the delay in registering Darjeeling tea as a GI product in the European Union and various other countries mean that the economic benefits of the GI process are yet to be received.
- Little progress has yet been achieved in terms of rural development. Workers have been employed here generation after generation for more than 150 years. Over time, their dwelling areas have taken the shape of villages inside the estates. Although producers do undertake various measures from time to time to improve these dwelling areas, including houses, it is hoped that once they obtain economic benefits from GI registration, the process of rural development will be accelerated.
- Misappropriation of the name is still taking place. In the absence of adequate regular monitoring, Nepalese tea is entering India both in processed and unprocessed form, flooding Indian markets. Nepalese tea resembles Darjeeling tea and is sold under the name Darjeeling, thereby receiving the benefits of the reputation of genuine Darjeeling tea.
- Domestically, compliance with GI norms within the tea trade is still poor. Some domestic intermediaries in the tea trade, including traders and retailers, are not yet

registered with the Tea Board of India, so that they are not obliged to sell tea according to the GI requirements. Some consumers are thus not obtaining genuine Darjeeling tea, despite paying a high price. The compliance of the domestic tea trade with the GI requirements should be enhanced so that domestic consumers also obtain GI benefits.

## Economic impact

### *Economic effects of GI registration*

The economic impact has been analysed in terms of various indicators (number of tea estates, area under tea, quantity of production, yield, price on domestic markets, price fluctuations, export development, quantities sold at auction etc.), comparing the figures for the years from 1991 to 2007/08, i.e. before and after GI registration. The results of analysis regarding five major variables are summarized in Table 6 below.

***Table 6: Impact of GI registration on five variables***

| Variables | Before GI | After GI |
|---|---|---|
| Number of tea estates | 102 in 1991 → 80 in 1997 | 85 from 1998 to 2009 → |
| Area under tea | 20 085 ha in 1991 → 17 228 ha in 2000 | 17 818 ha in 2008 → |
| Quantity of production | 13.93 million kg in 1991 → 9.18 million kg in 2002 | 11.59 million kg in 2008 → |
| Yield per hectare | 694 kg/ha in 1991 → 492 kg/ha in 1999 | 650 kg in 2008 → |
| Price | Rs 77.50/ kg in 1991 → Rs 128.52/kg in 2002 | Rs 204.88/kg in 2008 → |

The table shows the positive economic impact of GI registration on five variables – number of tea gardens, tea-production area, production quantity, yield and price. In this context, the growth and price charts given in Section 6 above (Figure 1 and 2 in part "Markets") are also relevant.

***Quality improvement***

Quality improvement started before the GI process, with a move toward adoption of good agricultural and manufacturing practices.

Since 1999, it has been mandatory to follow good agricultural and manufacturing practices in order to obtain GI registration. However, the GI process has itself further encouraged quality improvement, inasmuch as there is some assurance that high-quality tea will be protected from fake or false Darjeeling tea in domestic and international markets, which in turn may increase the price of the genuine article.

GI registration prevented the massive use of chemicals. Many conventional estates have discontinued the practice altogether and converted to organic cultivation and production. Quality has been further improved by the introduction of a more precise two-leaves-and-one-bud picking method instead of the previous less precise method. This improvement in quality started slowly in 1994/95, and then accelerated from 2000 onwards after the start of the GI process – although it was not a factor in GI definition.

The improvement in quality is reflected in a growing demand for Darjeeling tea on domestic and international markets, involving steadily increasing numbers of countries.

## Impact on rural development, economic and social aspects

***Evolution in producers' income***

Although the price of Darjeeling tea has not yet risen and no impact on producers' income has yet been observed, the price has resisted the generalized global fall in tea prices better than other teas. It is expected that in the post-depression period, when the quality sign is recognized in all the countries to which it is exported, there will be considerable improvement in the economic situation of Darjeeling tea producers, enabling them to make further investment in rural development.

***Evolution in employment***

Employment on tea estates is based on a very high fixed land-labour ratio, with 3.5 workers per hectare (Government of India Report, 2009). The livelihoods of approximately 70 percent of the total population of the Darjeeling hilly zone where 87 estates are located depend directly or indirectly on the tea industry. Although there is very little possibility of expansion in the area under tea, it is hoped in the industry that once the Darjeeling tea quality sign obtains recognition in European and other importing countries, the marketing situation will improve to such an extent that blending, packing and packaging will be carried out in Darjeeling, leading to employment for another 10 percent of local inhabitants.

***Deceleration in the rural exodus***

Earlier, when the tea estates were not functioning efficiently, some estates were closed, wages were not paid and workers left the estates in search of better jobs in other towns and cities in India. However, since GI registration, no estate in Darjeeling has been closed for economic reasons for the past seven or eight years. There are now sufficient job opportunities on tea estates, providing good wages and multiple fringe benefits. No one is migrating to the plains any more. In the entire Darjeeling tea-growing zone, the rural

exodus is therefore practically nil. Most of the workers who left the estates earlier have returned and others are still returning.

***Induced effect on tourism***

Darjeeling is a major tourism destination and tourism is a source of considerable revenue. The area is famous for a variety of reasons:

- the Toy Train, recognized as a UNESCO World Heritage Site and preserved as such;
- the city itself, known as the Queen of the Hills, with more than 30 interesting tourism sites for visitors;
- the tea gardens, encircling the town on all sides.

Many tea buyers and other people from various places in India and the world, including tourists, visit Darjeeling every day from March to November, staying in hotels and eating in restaurants. With increasing numbers of tourists (including tea tourists), this sector will create more job opportunities for local people and generate a greater inflow of money, leading to more development.

Tourists in Darjeeling now want to visit tea gardens and observe the manufacturing process, so there are good prospects for tea tourism. However, the sector still requires development, and recent efforts have been made to popularize it in the area. Some estate owners are thinking of opening their gardens to tea tourists on an experimental basis. Tourists will be able to stay in the traditional garden bungalows, mostly built by the original British owners but with modern amenities, in order to enjoy the serene atmosphere of the gardens. Thus they can view the lush tea gardens on their sloping land, discover the unique garden culture, trek along the raised grit roads and obviously taste the world-famous Darjeeling tea.

***Bungalow for tea tourism***

This approach could:

- develop and consolidate Darjeeling tourism by generating tourist satisfaction;
- enable tea producers to earn additional income from tourists (rental of accommodation and direct sale of made tea and other local products);
- promote tea marketing with the creation of an individual brand image;
- enable state and local governments to obtain more revenue from tourism;
- generate a positive awareness of the Darjeeling tea GI.

However, legal barriers are currently preventing estates from being opened to tourism. All the estates are leased, and the contracts with the state government do not provide for

tourism activities within the properties. Since tea tourism has huge economic prospects, a few estates have already started it on an experimental basis under the existing set-up, with limited capacities and resources. However, until contracts are amended to accommodate this activity, there is little possibility of its achieving success. For example, existing contracts do not allow lessees to build any new constructions within the prescribed area for any purpose. The unused portion of estates should be used for tourism purposes with the permission of the state government.

***Development of infrastructure***

In order to meet the full development needs of the Darjeeling tea industry, the Ministry of Commerce and Industry has declared the tea-production zone an agri-export zone with a view to make necessary developments under the Agricultural and Processed Food Product Export Development Agency. The memorandum of understanding is yet to be signed by the Tea Board of India, the West Bengal State Government and the Darjeeling Tea Association for development of this agri-export zone with the required infrastructure for tea promotion and export, with an expenditure of Rs 2 126.5 million. As part of this programme, the infrastructure for packing and packaging will be developed in the Darjeeling tea-production zone, along with development of estate roads and the communications network, and establishment of a Darjeeling Tea Park in Kolkata for the promotion of exports. Details of the agri-export zone scheme are available from the Agricultural and Processed Food Product Export Development Agency website (www.apeda.com).

***Development of relations and joint actions by producers and other actors in the supply chain***

The quality sign process has brought all the stakeholders together, and most of the producers, processors, traders, direct exporters and merchant exporters are now under the DTA umbrella and are registered with the Tea Board of India. Such registration is compulsory for those who intend dealing in Darjeeling tea under the GI sign. The DTA members meet from time to time to exchange their views on the GI process and also undertake collective action on various issues, ranging from production to sanitation to GI certified exports, thereby developing a collective sense of responsibility.

Relationships have further developed because the GI process has increased buyers' awareness and they are coming from abroad to visit estates in order to select the estate of their choice before purchasing tea. These micro-level relationships may be commercial, but they have developed mainly because of the GI process.

## Culture and tradition

People linked to the tea estates in any way are proud of being associated with the Darjeeling tea industry, in particular in the case of economically sound, stable estates. This sense of pride has developed among employees and their children because of the quality sign of Darjeeling tea and has increased steadily since registration of the quality sign.

## Environmental impact

Good practices for the production of safe, high-quality food (for example good agricultural practices and good manufacturing practices) on conventional estates and bio-organic or biodynamic estates to a large extent take environmental and natural resource protection into account.

***Soil erosion and landslides***

Soil erosion and landslides are two important factors that have a profound effect on tea estates in Darjeeling's hilly areas.

*Landslide on Monteviot tea estate (close view)*

*Landslides on tea estates (distant view)*

However, the China variety of tea cultivated in Darjeeling, with its sideways-spreading, deep-rooted system, is an excellent soil conserver. Soil conservation is also ensured by planting saplings of leafy plants indigenous to the region each year. In addition, construction of a drainage system, green crop cultivation before planting tea bushes, mulching, organic cultivation and stone riveting are some of the measures adopted in Darjeeling in accordance with good agricultural practices to prevent soil erosion, that represents one of the main environmental hazards in Darjeeling's hilly areas.

Biodiversity has also been preserved to a large extent through the reduction in applications of chemical fertilizer and pesticide on conventional tea estates in accordance with good agricultural practices, while a significantly greater contribution has been made by the conversion of estates from conventional to organic production. With organic cultivation, the number of different types and varieties of friendly insects, birds and animals is gradually increasing. In addition, increasing quantities of cow dung are needed for use as organic manure, so that the cattle population is steadily increasing with the conversion of more and more estates to organic production. Wild shrubs and herbaceous plants are also cultivated on various gradients within tea estates for animal fodder.

## Costs

***Production, manufacturing and marketing costs***

Various costs are incurred at various stages from production to marketing – cultivation, picking, processing, sorting, packing and packaging, and dispatch – in order to maintain and improve the quality of Darjeeling tea. The average production cost has been estimated at Rs 300 to 325 per kilogram of made tea, with estate-level cultivation and processing costs amounting to Rs 200 to 225 per kilogram, and administrative costs, including office establishment and taxes, amounting to Rs 100 to 125 per kilogram.

The production costs of tea are higher in Darjeeling than in any other tea-growing zone as a result of:

- the high altitude of the estates;
- very low yields per hectare;
- very high labour costs due to tough working conditions on 60º to 70º gradients, coupled with a very precise and selective leaf-picking technique;
- the low per capita productivity of the workforce;
- transportation bottlenecks, with poor road conditions;
- high transport and fuel costs;
- unpredictable climatic conditions;
- frequent political agitation.

***Certification costs***

Certification is required to indicate the authenticity of the product with regard to such variables as genuineness, origin, practices, hygiene, ecology and fair trade. No fee is required for the certificate of origin issued by the Tea Board of India to producers, processors, traders, exporters or others involved in the Darjeeling tea trade who are registered with the board and renew their registration regularly.

However, for other types of certification, the fees of the various accredited certifying agencies are very high. There is no worldwide standardized food safety and quality certification and different countries have different specifications and norms. Inasmuch as Darjeeling tea is an agro-based, manufactured, high-quality and mainly export-oriented product, certification from a number of agencies is required. Moreover, analysis and certification have to be carried out in importing countries, at considerable expense. Total certification costs are thus very high and represent a major constraint for the Darjeeling tea industry (for further details regarding certification, see Section 5, "Effective protection of the GI", above).

## SWOT analysis

The inherent qualities of the product and its proper management at all stages of production (cultivation, manufacturing, marketing etc.), leading to value addition along the supply chain, are its internal strengths, while the certificate of origin issued by the Tea Board of India for identification of the genuine product and other types of certification issued for improved product quality are additional strengths. However, the industry also faces certain weaknesses and constraints.

| Strengths (internal) | Weaknesses (internal) |
|---|---|
| • High quality and worldwide reputation<br>• Geo-agro-climatic conditions, with a favourable environment for tea production<br>• Easy conversion to organic production<br>• Skilled workforce of local people, with local traditions and know-how, as well as technical knowledge, a sense of be longing and self-esteem | • Erratic, unpredictable weather<br>• Continuing misrepresentation and misappropriation, in particular unmonitored entry of Nepalese tea<br>• Very high production costs: very low yields per hectare, a high land-labour ratio (1:3.5) and very high costs for such items as transport, energy, soil conservation, organic and biodynamic |

| | Weaknesses (internal) |
|---|---|
| | conversion and cultivation, and low productivity per labour unit<br>• Very high costs of the overlapping certification of various accredited certifying agencies for food safety or environmentally friendly production (lack of standardization of food safety and quality certification)<br>• Old age of tea bushes and their low replacement rate (2 percent per year)<br>• Most domestic consumers' lack of awareness of the quality sign or the Darjeeling tea GI |
| **Opportunities (context linked)** | **Threats (context linked)** |
| • Potential to increase production through an increase in the replacement rate for tea bushes from 2 to 10 or 12 percent per year in order to generate increased production in the future<br>• Opportunities for market development through creation of new markets in countries where Darjeeling tea is not yet sold<br>• Further opportunities to develop additional products or by-products of the tea industry with economic viability (for example, tea perfume from the flowers)<br>• Opportunities for tea tourism development | • Ongoing misappropriation of the name Darjeeling in many countries, including India<br>• Very high costs involved in registration and protection of the quality sign |

# 8. Conclusions

## Lessons learned

Darjeeling's exceptional geo-agro-climatic situation has created unique conditions that are very suitable for growing a superfine quality of tea that cannot be replicated elsewhere. However, various constraints and weaknesses may jeopardize the future prospects of the industry unless due attention is paid and appropriate measures are taken in time.

Darjeeling tea faces both internal and external difficulties in both the production and the marketing spheres. Efforts are made to solve external problems and marketing difficulties through the GI process, but little attention is paid to solving internal problems and difficulties, which is essential if the GI process is to be successful. There is a high demand for Darjeeling tea on the international market. However, there is a large gap between demand and supply, so that tea of other origins in other countries is coming onto the market to fill the gap and being sold under the name "Darjeeling tea". Various measures have been taken to protect the genuine article from fake or false versions, including enacting of the GI Act in India and

registration of the product under the same act. On the other hand, the area under tea in Darjeeling and the quantity of Darjeeling tea produced shrank strikingly over the years in the pre-GI period. Although the GI process is gradually improving the situation, the intervention of the appropriate authorities has become essential in order to increase the cultivation and production of this high-quality product.

Surprisingly, although legal measures are taken to protect Darjeeling tea against misappropriation, no measures are taken to increase the supply of the product on the domestic and international markets in order to reduce the shortfall between demand and supply by expanding the cultivated area, yields and quantities produced. Only 50.4 percent of the total area granted for tea cultivation is actually used for that purpose, while the remainder is used for various other purposes. There is therefore still some possibility of increasing production of Darjeeling tea.

Price increases over the years in sales at auction for the domestic market have been insufficient to offset the increased costs of production and marketing. With regard to the export price of Darjeeling tea, producers' experience is even worse. Export prices have also stagnated for several years in terms of US dollars or euros. In such a situation, the survival of tea estates becomes moot. However, owing to fluctuations in the exchange rate between Indian rupees and US dollars or euros, tea exporters and producers obtain some respite, but not enough to satisfy them fully.

The extraordinarily fine qualities of Darjeeling tea are expressed through the quality sign of a logo registered under the Trademark Act of 1999 as a certified trademark and the GI Act of 1999 as the first Indian GI product after prolonged joint efforts by the Tea Board of India and DTA, with a view to preventing misuse of the name Darjeeling on domestic and international markets. Despite this, the precise quantity of fake and false Darjeeling tea available on international markets remains unknown to the Tea Board, DTA or the government. The quantity of "duplicate" Darjeeling tea still flowing onto the international market needs to be assessed. The name Darjeeling has been misappropriated in various countries for non-Darjeeling tea, creating confusion among consumers, damaging the reputation of Darjeeling tea and diluting its brand image. The Darjeeling tea quality sign as an indication referring to its geographical origin has not yet been registered in many importing countries, especially in the European Union, although in many countries it is recognized as a certified trademark, collective trademark etc.

The genuineness, safety and quality of Darjeeling tea are assured by the certification of various authorities, accredited agencies or NGOs. The certificate issued by the Tea Board confirms the origin of Darjeeling tea. Quality and safety aspects are maintained because the tea is produced under good hygienic and sanitary conditions in accordance with the Sanitizing Standard Operating System, good agricultural practices and good manufacturing practices under the provisions of the Prevention of Food Adulteration Act. The HACCP certification process ensures that the product is safe for consumption. Other quality schemes and labels – organic, fair trade, eco-fair trade etc. – are certified by various accredited agencies. The certification fees charged by various agencies and NGOs regarding food safety and quality norms are very high. However, compliance with these norms is compulsory for export to various countries. The high cost of all these overlapping types of certification has become a problem to stakeholders in the supply chain. A solution therefore needs to be found.

Tea tourism is a potential source of substantial revenue and also an important way of promoting the Darjeeling tea quality sign and the GI concept. However, due to legal complications and the absence of suitable modalities, it cannot be developed for the moment.

## Recommendations

***Recommendations for supply chain stakeholders and the Darjeeling Tea Association***

- *Market promotion, the development of new markets and stable product positioning within and outside India* are needed on the part of the Tea Board of India through the assurance of product quality and safety. Such action will help to improve quality and also encourage increased production. The use of various promotional tools is needed so that domestic consumers become aware of the concept of the Darjeeling tea GI, thus increasing demand and allowing prices to keep pace with rising production costs.
- *The production and supply of this high-quality tea to the domestic and international markets should be increased* in order to reduce the shortfall between demand and supply: by increasing the area under cultivation and the yield, and by providing an appropriate environment to grow this precious product.
- *Tea tourism and other potential by-products should be developed*. However, some institutional obstacles need to be removed first (see the following recommendations for the Government of India and the West Bengal State Government).
- *For the boosting of collective action*. In order to boost collective action, DTA must take the necessary steps to bring the few non-member tea estates in the Darjeeling delimited zone under the DTA umbrella at the earliest possible date. These non-member estates should thus join DTA, settling their differences and reservations, if any, so that collective action can be stronger, more effective and result-oriented. As a collective body, DTA should ensure more transparency in the Darjeeling tea trade with regard to the total quantity exported, the quantities directly exported and exported through merchant exporters, the quality and grade of tea exported, and the average price on domestic and international markets for the various grades.
- *For value addition in the value chain.* Action is needed by the Tea Board of India, DTA and all producers to make Darjeeling tea a product instead of a commodity. Efforts are needed at all levels to popularize the concept of packet sales. The producer-level packing of tea into small packets of various sizes bearing the quality sign would definitely allow value addition. Producers should arrange individually or collectively for the necessary finance for this purpose by obtaining long-term loans at low interest rates from commercial banks in cooperation with the Tea Board of India under the central government guarantee system.
- *For strong integration in the supply chain.* The Tea Board of India should act in association with DTA to include all tea traders and large-scale retailers within the GI supply chain in order to boost the comprehensive character of the system.

***Recommendations for the Tea Board of India, the Government of India and the West Bengal State Government***

The unique blend of geo-agro-climatic conditions in Darjeeling for tea production should be exploited to the full through efforts on the part of the Government of India, the West Bengal State Government and the Tea Board of India so as to obtain the maximum benefit.

- *For strict vigilance on the international market.* The Tea Board of India, which has been the main instrument in the registration of Darjeeling tea, should be more alert and vigilant in protecting all the various quality signs of Darjeeling tea on domestic and international markets, because misappropriation is still taking place – according to the allegations of many producers. The Tea Board should also seek to assess and quantify the fake and false Darjeeling tea currently being sold on domestic and international markets even after the registration of Darjeeling tea under the GI Act.

- *For the introduction of a standardized certification system.* The Ministry of Commerce and Industry should take the necessary steps to introduce a standardized certification system through negotiations with various countries, in order to reduce the burden of costly overlapping certification.

- *For the promotion of tea tourism.* The West Bengal State Government, in association with DTA, should adopt the necessary steps to remove legal barriers and formulate suitable modalities for the promotion of tea tourism on Darjeeling tea estates with a view to generating income from tourists, both Indian and foreign, while making them aware of the concept of the Darjeeling tea GI through a proper campaign. Guidelines need to be formulated for sharing income from tea tourism among estate owners and the state or local government, and procedures laid down for the development of tourism infrastructures. The existing lease contracts between the state government and tea producers (which do not permit the latter to build any new construction within the prescribed area for any purpose) need to be amended to allow tea estates to build the necessary constructions to promote tea tourism.

- *For generic promotion of the quality sign and the GI.* The Ministry of Commerce and Industry must take any actions deemed necessary for worldwide recognition of the Darjeeling tea GI, using WTO as the appropriate forum. The Ministry of Commerce and Industry and the Tea Board of India should take appropriate steps through trade missions to end the long price stagnation of Darjeeling tea on international markets, especially in such countries as the United States, European Union countries, Australia, Japan, Iran and Sri Lanka for the survival and better performance of the industry.

- *For the maintenance of a congenial working environment.* The Government of India and the West Bengal State Government must come forward to protect this flagship of India's tea industry from external trouble during any political disturbance, including agitation for separate statehood (by taking appropriate measures to restore and maintain peace and a good working environment on tea estates). In more general terms, tea estates should be kept away from the effects of any political disturbance. The Government of India and the West Bengal State Government must take steps to ensure peace, tranquillity and a congenial working environment on Darjeeling's tea estates in order to save the world-famous industry from further economic and social disruption.

- *For the improvement of labour productivity.* The Labour Department of the West Bengal State Government should strive to inspire workers to enhance both the quantity and the quality of Darjeeling tea during tripartite negotiations for higher wages and bonuses, thus enhancing the work ethic on tea estates.

- *For technical innovation.* The outdated machinery in Darjeeling's tea factories occupies a great deal of space, runs by primitive methods with a huge consumption of fuel and time, and needs to be replaced by more efficient, compact, time- and cost-saving machines that enhance aroma retention capacity and increase whole-leaf recovery. Packaging materials and systems must also be developed that can retain quality for longer periods. Such advances require innovative research at the Indian Institute of Technology and engineering colleges and institutions, including Jadavpur University and the Bengal Engineering and Science University.

- *For the development of infrastructure.* The West Bengal State Government must ensure a good infrastructure network in the tea plantation areas of Darjeeling, including remote villages, by providing good roads, an adequate water supply and a continuous power supply, and building the bridges needed for the regular flow of inputs and outputs to and from the estates, thereby enhancing the efficiency of the whole system. The installation of light-weight ropeways within tea estates for the speedy transfer of picked leaves from distant zones to the factory (currently available on only a few estates) has become essential with a view to increasing the quality of made tea and reducing primary transport costs. The Tea Board of India should collaborate with DTA and individual tea estates to explore the possibility of installing such ropewalks at a lower or subsidized installation cost. The West Bengal State Government should col laborate with the National Highway Authority to improve road conditions so that roads are made suitable for higher tonnage vehicles, which could then carry inputs and out puts at a lower cost. The district and local administrations should accord the necessary permission for the movement of high-capacity vehicles for tea estates. The concerned departments of the Government of India should ensure the availability of telecommunication and internet connections on each tea estate, which should be equipped with a computerized system and trained staff to work with various software packages. The concerned departments of the central and state governments should work with the Tea Board and DTA to provide the industry with the necessary technical and financial assistance to solve power problems through the development of hydroelectric, solar and wind power.

- *For miscellaneous assistance.* Various rural development schemes of the central and state governments should be made available to the Darjeeling tea industry for the improvement of rural areas and villages on tea estates, where workers' families live in traditional style, thereby to a certain extent reducing the burden of social costs borne by producers. Considering the future requirement of the industry for skilled staff, an appropriate package for human resource development should be introduced to impart ongoing training.

- *For research and development.* Research for tea estates on various cultivation and botanical aspects, including plant species, cloning etc., can be undertaken by

agricultural universities and the Tea Department of the North Bengal University in association with the Darjeeling Tea Research and Development Centre, the Tea Research Association etc. Research and training on various aspects of management, export and marketing, including WTO and TRIPs, could be undertaken by institutions with expertise and resources, such as the Indian Institute of Management in Kolkata, leading to an over-all improvement in industry performance. The Tea Board of India should take the necessary initiative to fill currently vacant positions for scientists and researchers in the Darjeeling Tea Research and Development Centre in order to increase the centre's efficiency and output. Research is also needed to develop a more efficient packaging system capable of retaining the quality of tea for a longer period. Initiatives may also be taken, initially on an experimental basis, to use the tea flowers that bloom in such abundance in September, October and November, with their light but attractive fragrance. If the experiments are successful, good-quality perfume could be prepared as a by-product of tea, after proper research and development on the subject, and could generate appreciable amounts of income.

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# VI. Nakornchaisri pummelos, Thailand Impact on farming practices of producing pummelos under geographical indication

by

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## Abstract:

The Nakornpathom Provincial Chamber of Commerce submitted the application for GI registration of Nakornchaisri pummelos, and this was granted on 30 September 2005 in order to protect Nakornchaisri growers and prevent the deception of consumers. The unique geographical conditions and traditional farming systems of the Nakornchaisri zone have long been recognized as important factors in the production of quality pummelos. In addition, there are well-established distribution networks in the zone, especially for export. Nakornchaisri growers receive a premium price for their produce, and the price set in the area has been used by traders as a benchmark for pummelos from other sources.

The study compared the farming systems and production costs of GI-designated areas with those of neighbouring districts in Rachaburi Province, outside the GI area. There are very clear differences in farming concepts between the two zones, not as a reflection of GI registration but rather as a result of the social, cultural and economic contexts. Moreover, it is hard to assess the impact of GI registration because Nakornchaisri growers have always received premium farmgate prices and pummelo production has now expanded to many other regions of the country, putting in question the relevance of the current GI system (delimitation of area, limited involvement of producers, impact of GI registration on market demand etc.).

# Introduction

The present study was carried out to examine the impact on farming practices of producing pummelos under the Nakornchaisri geographical indication (GI). After presenting the product and reviewing the GI code of practice, the report examines farming practices and the marketing system for Nakornchaisri pummelos. The final section presents the lessons learned and draws conclusions from the study.

## 1. Nakornchaisri pummelos and their list of requirements (or code of practice)

### Nakornchaisri pummelos

The pummelo is one of the main ancestors of the grapefruit. Botanically, it is identified as *Citrus maxima* Merr. (*C. grandis* Osback; *C. decumana* L.). The pummelo is tropical or near-tropical and is native to southeastern Asia. It flourished naturally at low altitudes close to the sea. Because of its restricted cultivation areas, it is often overshadowed by the grapefruit. Currently, it is much cultivated in southern China, Thailand, Taiwan, the far south of Japan, southern India, Malaysia, Indonesia, New Guinea and Tahiti. As a luscious fresh fruit, it is famous and even more popular than grapefruit in the Far East.

The pummelo is one of the most popular citrus fruit on Thailand's domestic market. It was first introduced into the country in Samphran District of Nakornpathom Province. Nakornpathom's main production areas today are in Nakornchaisri and surrounding districts, which lie in the low swampy plain along the river. Combined with the fact that salty sea-water filters into the land at high tide, this location produces fruit with a specific delicate flavour and texture. The pummelo is considered of potential interest in regional trade. Thailand started exporting pummelos some 30 years ago and is still the only country in the region with a mature and sustainable pummelo export trade. Ever since the start, this export trade has depended mainly on fruit (the CV Tongdee variety) grown in the Nakornpathom Province. Hong Kong is the main export market. It is claimed that the attributes of Nakornchaisri pummelos are a result not only of unique geographical conditions, but also of human factors, entailing specific farming traditions and production skills. Nakornchaisri pummelos have a reputation well-recognized in the market, and growers enjoy an almost guaranteed market and high price. GI registration to identify the produce, protect it and promote its marketing was thus initiated in 2005 by the Nakornpathom Chamber of Commerce and was expected to be welcomed by the various stakeholders along the supply chain.

◀ ***Nakornchaisri pummelo***

## Registration and list of requirements for producing Nakornchaisri pummelos

In Thailand, the Ministry of Commerce's Department of Intellectual Property is in charge of the protection and approval of GIs. By 8 January 2010, there were 32 GIs registered with the Department of Intellectual Property: 26 Thai products and 6 foreign ones. Among the 26 Thai GIs, there are two for pummelos: one for Nakornchaisri pummelos and one for Chainat Khaotangkwa pummelos.

The application for GI registration for Nakornchaisri pummelos (application 47100002) was submitted by the Nakornpathom Provincial Chamber of Commerce on 29 September 2004 and granted on 29 September 2005 (registration 48100002).

The following requirements appeared with slight modifications in the GI registration filed with the Department of Intellectual Properties, to allow pummelo growers to carry the GI mark. The list of requirements covers production areas, characteristics of the fruit, production practices and processes, and management norms.

***Definition.*** Nakornchaisri pummelos refer to two cultivars, Tongdee (brilliant gold pummelo) and Kao Nam Pueng (white honey pummelo) grown in Nakornchaisri, Samphram and Puttamonton Districts of Nakornpathom Province.

***Physical characteristics of the fruit***

| | | |
|---|---|---|
| Shape | CV Tongdee | Nearly round to oblate with slightly flat end, no neck |
| | CV Kao Nam Pueng | Nearly round to oblate. Size larger than Tongdee |
| Peel | CV Tongdee | Thin peel, yellowish green lime in colour, dotted with small oil glands |
| | CV Kao Nam Pueng | Thin peel (slightly thicker than Tongdee), yellowish green in colour, rough, dotted with oil glands larger than Tongdee |
| Pulp | CV Tongdee | Pale-yellow to pink, pulp soft, firm but not hard, heavy feel, dry, not becoming watery even when fully ripe |
| | CV Kao Nam Pueng | Whitish to pale yellow in colour, the source of its cultivar name of "honey", pulp firm but not hard, heavy feel, dry, not becoming watery even when fully ripe |
| Taste | CV Tongdee | Sweet with faintly acidic flavour, no bitterness |
| | CV Kao Nam Pueng | Sweet to sub-acid flavour, no bitterness |

◀ ***Physical characteristic of the fruits***

***Production practices.*** The tree flourishes naturally in the low-lying swampy plain near the coast in Nakornchaisri and surrounding areas. Farmers claim that salt contributes to the flavour and juiciness of the fruit. The prime growing region near Bangkok in central Thailand has a mean temperature of about 28 °C and mean rainfall of 143 centimetres, heaviest from May to October and scarce in January, February, March, November and December.

In the low-lying orchards of the region, farmers dig ditches and channels (2 to 2½ metres wide at the surface) for drainage and as routes for in-farm transportation. They also set up elevated beds (4 to 5 metres wide) in which trees are planted 3 to 4.5 metres apart (and 6 metres apart between channels). It is essential to dry out the elevated beds for one to two months before planting in order to prevent Phytophthora root rot. The ditches have to be constantly deepened and widened, and soil has to be added to the beds in order to counteract erosion.

***Young orchard of Nakornchaisri pummelos (on dykes)***

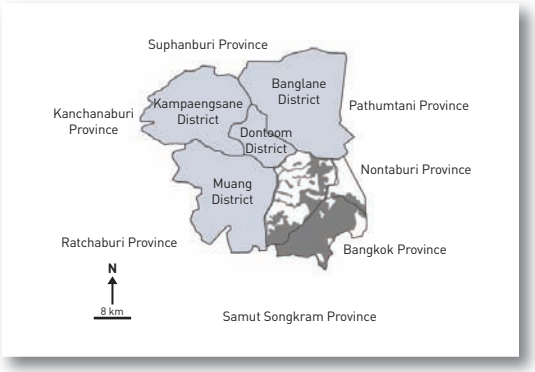
***Harvesting.*** CV Tongdee usually flowers two to four times a year. The fruit ripens approximately six to seven months after flowering (although, according to a field interview, the fruit is harvested eight to nine months after flowering). Flowering has been adjusted by thinning, watering restrictions and fertilization so that the main crop is harvested in August to September when export demand is high. There may also be a small crop between February and April. CV Tongdee is the leading Thai cultivar and perhaps the only one exported in substantial quantities to Hong Kong. CV Kao Nam Pueng may flower four or more times a year, so that harvesting can become a year-round operation. The fruit ripens and can be harvested approximately six to six-and-a-half months after flowering (although, according to a field interview, the fruit is harvested seven to eight months after flowering). The fruit of this cultivar is some of the most popular on the domestic market and some has been exported to Shanghai, China, in the past two or three years.

***Packaging.*** The word "Nakornchaisri pummelo" should appear on the labelling of the package.

***Specific links with the characteristics of the geographical area.*** Pummelos grow fairly well on mudflats overlying clay to loamy clay soil, characteristics of the swampy plains beside the Nakornchaisri and Tha Chin Rivers in the Nakornchaisri zone and the Rachaburi River in Rachaburi Province. The soil profile indicates a deposited top layer that is organically rich, a brownish middle layer of clay and a lower layer, approximately 2 metres deep, of sand and shell. The trees are highly tolerant of brackish water, the rich river silt and the salty water pushed inland at high tide. The soil is lightly acid to neutral, with a pH ranging from 6.5 to 8.

***Origin and distribution history.*** The pummelo is believed to have originated at some unknown date in the Oomyai Subdistrict of Samphran District. After a severe flood in 1942, sweet oranges were introduced into the area, and one pummelo tree was accidentally included. Once planted, pummelos gradually expanded into other parts of Samphran District and then to Nakornchaisri District, where the fruit attained the best quality. Hence the name "Nakornchaisri pummelo".

***Geographical location.*** The trees are grown in the three adjacent districts of Nakornchaisri, Samphran and Puttamonton, which share similar geographical characteristics.




***Map of Nakornchaisri pummelo cultivation area (dark grey areas) in Samphran, Nakornchaisri and Puttamonton Districts of Nakornpathom Province***

***GI monitoring and certification.*** GI management norms include requirements for grower and trader registration, a monitoring and inspection system, traceability, a certificate of origin and clear labelling on the packaging. However, there is no specification as to what type of monitoring, inspection and traceability systems should be put in place.

Quality standards are not included in the GI registration. The following standards are found in the "Pummelo standards" published in December 2004 by the National Office of Agricultural and Food Standards.

***Minimum quality requirements (national standards).*** Pummelos should be:

- sound: produce affected by rot or deterioration such as to make it unfit for consumption is excluded;
- clean, basically free of any foreign matter or taste/smell;
- surface blemishes caused by bruising and pests affecting the general appearance of the produce ranging from less than 10 to 30 percent of the surface depending on grade;

| Quality grade | A | B | C | D |
|---|---|---|---|---|
| Surface blemish | <10% | 10.1-20.0% | 20.1-30.0% | >30% |

- free of damage caused by sunburn or high temperature;
- free of any foreign smell and/or taste;
- carefully picked and having reached an appropriate degree of development and ripeness in accordance with criteria specific to the variety and the area in which they are grown;
- minimum total soluble solids content of no less than 8 percent for CV Tongdee and 7 percent for CV Kao Nan Pueng;
- colour and shape typical of the variety, with a uniform surface colour that is more green than yellow.

***Size grade requirements and packaging***

| Variety | Grade | Circumference (inches) | Weight (kg) | Number of fruit per box | Net and gross weight (kg) | Market |
|---|---|---|---|---|---|---|
| **CV Kao Nam Pueng** | | | | | | |
| | 0 | >21.0 | >1.5 | | | Domestic |
| | 1 | 19.1-21.0 | >1.3 | 9,12 | #9:14.0-15.6<br>#12:16.0-17.6 | Domestic and export |
| | 2 | 18.1-19.0 | >1.10 | 14 | 17.0-18.0 | Domestic and export |
| | 3 | 17.1-18.0 | >0.9 | 16 | - | Domestic and export |
| | 4 | 16.1-17.0 | >0.7 | 18 | - | Domestic and export |
| **CV Tongdee** | | | | | | |
| | 0 | >20 | >1.2 | | | Domestic |
| | 1 | 17.1-20.0 | >0.9 | 12, 14, 16 | #12:17.1-18.5<br>#14:18.1-19.5<br>#16:17.1-18.5 | Domestic and export |
| | 2 | 16.1-17.0 | >0.8 | 20 | 18.6-20.0 | Domestic and export |
| | 3 | 15.1-16.0 | >0.7 | 22 | 16.6-18.0 | Domestic and export |
| | 4 | 14.0-15.0 | >0.6 | 24, 28, 32 | - | Domestic and export |

***Quality grade requirements***

| Quality attribute | A | B | C | D |
|---|---|---|---|---|
| **CV Kao Nam Pueng** | | | | |
| Total soluble solids (%) | >9.0% | 8.1-9.0% | 7.0-8.0% | <7% |
| Acidity (%) | 0.4-0.9 | 0.4-0.9 | 0.4-0.9 | >0.9 |
| TSS/acid ratio | >18.0 | 12.1-18.0 | 8.0-12.0 | <8.0 |
| Puffiness (%) | 0 | <5% | 5.1-10.0 | >10% |
| **CV Tongdee** | | | | |
| Total soluble solids (%) | >10.0 | 9.1-10.0 | 8.1-9.0 | <8.0 |
| Acidity (%) | 0.4-0.9 | 0.4-0.9 | 0.4-0.9 | >0.9 |
| TSS/acid ratio | >18.0 | 12.1-18.0 | 8.0-12.0 | <8.0 |
| Puffiness (%) | 0 | <5% | 5.1-10.0 | >10% |

# 2. Farming practices and Nakornchaisri pummelo markets

## Production statistics, trends in the Thai pummelo sector and the proportion of pummelos produced in GI-designated areas

Total Thai pummelo production acreages and tonnages increased more than two-fold in five years as shown in Table 1, from about 100 000 rai and 75 000 tonnes in 1992 to 200 000 rai and 120 000 tonnes in 1997, and to 283 000 rai and 267 000 tonnes in 2002. Production in 2006 increased slightly to about 258 000 rai and 295 000 tonnes, while total production in 2007 is estimated at more than 300 000 tonnes. The difference between the planted area in column 2 and the harvested area in column 3 is accounted for by new pummelo plantations less than four years old. New areas under pummelo production increased rapidly in 1995 and continued to increase with years of high prices until production reached more than 250 000 tonnes in 2002-2003, when prices started to fall. The downward trend in farm prices continued until 2006.

***Table 1. Annual production, farmgate price and farm value of pummelos grown in Thailand, 1982-2006, and estimated production in 2007***

| Year | Total production | | | | | Production (Nakornpathom) | | Production (Rachaburi) | |
|---|---|---|---|---|---|---|---|---|---|
| | Planted area (rai) (2) | Harvested area (rai) (3) | Production (tonnes) | Farm price (baht) | Farm value (million baht) | Planted area (rai) | Production (tonnes) | Planted area (rai) | Production (tonnes) |
| 1982 | 67 962 | 59 466 | 32 956 | 11.36 | 374 377 | | | | |
| 1987 | 94 248 | 66 714 | 44 850 | 11.79 | 528 787 | | | | |
| 1992 | 91 172 | 59 015 | 75 688 | 13.33 | 1 008 924 | | | | |
| 1993 | 98 290 | 63 412 | 82 395 | 13.25 | 1 081 737 | 10 623 | 16 939 | 1 081 | 753 |
| 1994 | 130 365 | 64 654 | 81 558 | 13.36 | 1 089 609 | 9 166 | 14 310 | 983 | 556 |
| 1995 | 162 740 | 72 030 | 87 589 | 14 12 | 1 236 763 | | | | |
| 1996 | 177 288 | 71 263 | 89 544 | 15.46 | 1 384 345 | 7 849 | 12 355 | 1 569 | 818 |
| 1997 | 204 195 | 87 934 | 121 573 | 15.06 | 1 830 883 | 9 100 | 13 206 | 3 228 | 826 |
| 1998 | 225 561 | 94 739 | 127 478 | 16.36 | 2 085 538 | 9 871 | 23 189 | 3 464 | 1 309 |
| 1999 | 222 734 | 120 190 | 164 329 | 15.59 | 2 561 892 | 10 034 | 29 401 | 3 408 | 2 211 |
| 2000 | 242 828 | 145 446 | 183 930 | 15.5 | 3 034 845 | 10 034 | 29 401 | | |
| 2001 | 264 256 | 189 726 | 224 579 | 16.58 | 3 723 520 | 10 778 | 18 262 | | |
| 2002 | 283 826 | 202 013 | 267 288 | 16.88 | 4 506 476 | 11 012 | 18 437 | | |
| 2003 | 229 920 | 165 490 | 265 750 | 9.69 | 2 575 117 | 9 140 | 13 464 | 2 721 | 3 064 |
| 2004 | 173 413 | 135 389 | 197 716 | 11.51 | 2 295 483 | 7 748 | 11 768 | 2 542 | 2 709 |
| 2005 | 227 915 | 192 103 | 276 288 | 7.84 | 2 168 745 | | | 628 | 1 503 |
| 2006 | 258 166 | 197 862 | 295 210 | 7.38 | 2 178 650 | 3 540 | 4 500 | 744 | 940 |
| 2007 | NA | 200 965 | 308 079 | NA | NA | 6 965 | 7 000 | 927 | 763 |

The corresponding farm values for Thai pummelos also rose from 1 000 billion baht in 1992 to 1 830 billion baht in 1997 and 4 500 billion baht in 2002. After steadily rising for some years, farmgate prices started to fall in 2003 as production areas expanded and the tonnage exceeded 250 000 tonnes from a harvested area of 200 000 rai. As farmgate prices fell, farm value fell to 2 179 million baht in 2006. There are complicated reasons for the current downward trend in prices, one of the main ones being that new production areas may not be suitable for growing pummelos. The proportion of tradable fruit in some regions is as low as 20 percent. The fruit from these new regions is often of unreliable quality in terms of appearance, disease, pest infestation, sooty mould, surface blemishes of various sorts, thick peel, puffy fruit, variation in eating quality, underripe or overripe when harvested, and a bitter taste.

Despite the increase in total production in the country, production in Nakornpathom Province decreased as a result of high land prices and increasing commercial and housing activities, falling from 10 000 rai and 17 000 tonnes in 1993 to 9 100 rai and 13 000 tonnes in 1997, and 6 600 rai and 12 000 tonnes in 2004. In 2006/07, the area under pummelos in Nakornpathom remained stable at about 7 000 rai. Current pummelo production in the province accounts for less than 5 percent of total production and comes mainly from the GI-designated areas in Nakornchaisri District (1 300 rai), Samphran District (4 500 rai) and Puttamonton District (250 rai). The pummelo production acreage decreased significantly in GI-designated areas in Samphran and Nakornchaisri Districts, while production in Puttamonton District is insignificant (see Table 2).

***Table 2. Production of pummelos grown in GI-designated districts, 2001-2006***

| | Nakornchaisri | | Samphran | | Puttamonton | |
|---|---|---|---|---|---|---|
| Year | Area (rai) | Production (tonnes) | Area (rai) | Production (tonnes) | Area (rai) | Production (tonnes) |
| 2001 | 2 111 | 3 026 | 6 705 | 13 891 | 181 | 362 |
| 2002 | 1 898 | 2 814 | 6 653 | 13 777 | 255 | 765 |
| 2003 | 1 825 | 3 413 | 5 928 | 12 087 | 255 | 765 |
| 2004 | 1 524 | 1 910 | 4 539 | 8 773 | 237 | 339 |
| 2005 | 1 524 | 1 910 | 4 539 | 8 773 | 237 | 339 |
| 2006 | 1 300 | | 4 500 | | 250 | |

## Thai pummelo exports and the proportion of GI pummelos in the export trade

***Table 3. Total exports of pummelos from Thailand and exports to major markets in Hong Kong and China, 1992-2006***

| Year | Tonnes | Value (thousand baht) | Export to Hong Kong | | Export to China | |
|---|---|---|---|---|---|---|
| | | | Tonnes | Value | Tonnes (thousand baht) | Value (thousand baht) |
| 1992 | 5 889 | 71 854 | | | | |
| 1993 | 5 083 | 53 159 | | | | |
| 1994 | 3 985 | 67 813 | | | | |
| 1995 | 4 776 | 56 122 | | | | |
| 1996 | 6 182 | 66 907 | 5 221 | 48 557 | - | |
| 1997 | 3.247 | 44 375 | 2 660 | 34 078 | - | |
| 1998 | 4 496 | 66 317 | 4 168 | 56 783 | - | |
| 1999 | 6 432 | 103 468 | 4 278 | 70 925 | 1 208 | 13 940 |
| 2000 | 6 209 | 100 410 | 3 947 | 53 603 | 1 572 | 34 893 |
| 2001 | 6 574 | 101 531 | | | | |
| 2002 | 7 518 | 101 388 | 5 068 | 55 508 | 1 341 | 19 494 |
| 2003 | 7 607 | 114 125 | 3 685 | 37 215 | 2 069 | 32 912 |
| 2004 | 7 313 | 102 039 | 2 901 | 29 800 | 541 | 14 711 |
| 2005 | 6 293 | 99 673 | 2 648 | 14 970 | 1 390 | 21 385 |
| 2006 | 9 386 | 132 904 | 3 660 | 33 074 | 2 928 | 30 309 |

Hong Kong and China are the most important export markets for Thai pummelos. Hong Kong accounts for some 70 percent of the country's total exports (see Table 3). Historically, Hong Kong was the port of entry for the re-export of Thai fruit to China, and direct export to China is fairly recent. Reliable sources indicate that a large quantity of pummelo exports consigned to China was actually channelled to Hong Kong markets. The reversion of routing from China to Hong Kong was the result of China's entry into WTO and its consequent reduction in its tariff rate for fresh fruit. China has its own pummelo production in the south of the country with production costs that are a fraction of the cost of Thai pummelos. However, the quality is very poor, so that the demand from China may increase. It should be noted that China has recently been putting major effort into pummelo variety improvement. CV Tongdee accounted for more than 95 percent of exports to Hong Kong. The main aim of the Nakornchaisri pummelo GI registration is therefore to protect Thai growers and maintain the Hong Kong export market long enjoyed by Thailand, rather than to expand into Chinese markets.

The Nakornchaisri name has been recognized since the early years of pummelo exports to Hong Kong and continues to enjoy a good reputation even today among a group of loyal, enthusiastic consumers. Some 70 percent of the pummelos produced in Nakornchaisri are CV Tongdee, a preferred variety in the Hong Kong market. After long years of experience, the exportable rate has reached an average of about 80 percent to as high as 90 percent on some farms, and growers are easily able to adjust their harvest season to meet peak export demand in August and September during the Chinese mid-autumn festival. Nakornchaisri and the surrounding areas have been and continue to be indispensable as the main export supply base. Traders and exporters have been exploring supply sources from other regions of the country with reasonable success. The quality of fruit from some of the new regions is almost equal to that of Nakornchaisri pummelos. However, other pummelo-growing regions in the country are not yet able to provide high-quality fruit ready for harvesting during the peak export season. The trees grow well in lighter types of soil such as loam or sandy loam in other growing regions in the country. They can apparently monopolize large quantities of nitrogen for development of their fruit because roots grown in such soil tend to produce long, profuse systems. An excessive nitrogen nutrient uptake results in puffy fruit, thick peel and unreliable quality, especially during the first two years of harvesting.

## Production costs of a pummelo farm (trees aged 5 to 25 years)

The farming approach in the GI-designated area around Nakornchaisri (the three districts of Nakornchaisri, Samphran and Puttamonton) is very different from that found in Rachaburi Province.

Traditionally, Nakornchaisri is famous as the land of pummelos, with a long history and excellent reputation. Farms are usually small, with an average size of less than 10 rai. Most farms grow mainly CV Tongdee, which is the preferred variety for export. Despite their small size, farms in the area are more export-focused than farms elsewhere. The area also has two major packing plants. With a relatively stable market, Nakornchaisri growers have improved their skills in order to maximize profits and receive higher prices by adjusting their harvest season to meet peak export demand in August and September. Lastly, based on their traditional farming systems, Nakornchaisri growers grow a cultivar that meets consumers' variety preference. Their experience enables them to improve their farming techniques in order to adjust the harvest season and attract traders or exporters so as to form effective sourcing networks, thus receiving higher prices for their produce and maximizing profits.

Rachaburi, where the average farm size is even smaller than in Nakornchaisri, is marked by the wide range of crops grown: coconuts, grapes, citruses and cash crops such as papayas, bananas and orchids. The most common companion crop for pummelos is coconuts. Farming is based on a greener, more sustainable approach with fewer applications of fertilizer and chemical sprays. The yield per rai is much less for farms in the Rachaburi area, where growers manage risks based on the traditional low-input farming system, growing a range of crops.

◀ ***Pummelos grown on dykes, in association with other trees***

The very different farming systems in the two areas surveyed are based purely on traditional practices, the regional culture and the economic background. The information indicates that the farmers' production methods, decision-making processes and success and failure factors are not related to GI registration. The differences in farming systems are reflected in the difference in production costs in the two regions, as seen in Table 4.

***Table 4. Comparison of the average cost (baht/rai) of pummelo production in various regions of Thailand, 2006***

| Item | Central region (include Nakornpathom) | Ratchaburi | Whole country (average) |
|---|---|---|---|
| 1. Variable cost | 6 525.11 | 3 433.39 | 7 253.99 |
| 1.1 Labour cost | 3 217.78 | 1 573.64 | 2 975.75 |
| Land preparation | (236.50 for 1st year) | (176.00 for 1st year) | (400.18 for 1st year) |
| Planting | (193.30 for 1st year) | (62.00 for 1st year) | (164.33 for 1st year) |
| Farm care (pruning, water level adjustment, flood prevention) | 2 369.84 | 1 259.41 | 1 747.44 |
| Harvesting | 847.94 | 314.23 | 1 228.31 |
| 1.2. Material input cost | 2 852.09 | 1 620.21 | 3 772.15 |
| Planting materials | (709.29 for 1st year) | (1.095.00 for 1st year) | (930.05 for 1st year) |
| Fertilizer | 1 345.51 | 1 019.41 | 1 899.41 |
| Pesticides and herbicides | 464.19 | 242.08 | 763.89 |
| Fuel/electricity | 412.27 | 221.18 | 370.05 |
| Equipment/machinery | 580.49 | 137.00 | 705.83 |
| Maintenance | 49.63 | 0.54 | 32.97 |
| 1.3 Opportunity cost* | 455.24 | 239.54 | 506.09 |
| 2. Fixed cost | 1 924.79 | 1 546.72 | 2 015.21 |
| Land (rent) | 561.62 | 473.20 | 505.07 |
| Depreciation | 402.74 | 106.72 | 444.93 |
| Opportunity cost | 61.72 | 15.44 | 59.45 |
| Pre-harvest cost (up to the 4th year) | 898.71 | 951.36 | 1 005.76 |
| 3. Total cost (baht per rai) | 8 449.90 | 4 989.11 | 9 269.20 |
| 4. Cost (baht per kg) | 6.59 | 8.41 | 4.24 |
| 5. Yield (kg per rai) | 1 282.81 | 592.13 | 2 188.32 |

Note: * Opportunity cost = the money (variable cost) if it is put in the bank at a 7 percent interest rate.

The subsections below summarize general farm information for three cases surveyed in GI-designated areas in Nakornchaisri and surrounding districts in order to analyse factors affecting farming systems and production costs, and the various reasons why growers make their particular decisions. The sizes of the farms surveyed ranged from 8 to 30 rai. A size of more than 10 rai is considered fairly large and probably quite wealthy.

***Farming system in Nakornchaisri GI area:***

***Land and soil preparation.*** The soil in Nakornchaisri District is marked by organic deposits in the top layer, with clay or clay-loam subsoil – considered ideal for pummelos. Farms in the Nakornchaisri GI areas that lie along Nakornchaisri and Tha Chin Rivers are mainly old-established orchards with similar requirements for land preparation. Unlike farms in other regions of the country, these need dykes around them. Growers dig ditches or channels for drainage and build raised beds on which to plant trees. After preparation, the land should be allowed to dry, preferably for two weeks, before pummelos are planted in the raised beds. The water-level in the beds, sometimes at a depth of only 50 to 70 centimetres for root development, is maintained by high raised dykes and water gates with pumps to prevent flooding at high tide and allow water to come in during the dry season. Maintenance of the dykes, continual deepening and widening of the ditches, and the addition of soil from the ditches to the beds are needed every two to four years to counteract flooding and erosion. One of the farms recently had this job carried out at a cost of 10 000 baht. Yearly flooding during the rainy season, lasting one to three months or even longer, is becoming a routine occurrence. Sand-bagging the dykes, maintaining the water-level and flood prevention activities are other major items of expenditure for farms.

***Planting and cultivation.*** Trees are planted in flat raised beds in two rows, with a spacing of 3 × 3 or 4½ metres or 4 × 4 or 5 metres between rows and about 6 metres between beds. The space taken up by ditches or channels means that there are fewer trees per hectare – which accounts for the lower yield per rai than the national average. Planting density ranges from 40 to 90 trees per rai, with 50 being a fairly standard rate for CV Tongdee. *Phytophthora* root rot is a major problem, and individual diseased trees are removed, burned and replaced. Pummelo decline is caused by a virus (tristeza) and a bacteria-like agent (greening), which set in after three to four years or six to eight years depending on the variety, the severity of the strain, and general farm care. Growers are reluctant to use disease-free planting materials because of the higher cost – 70 baht as against 20 to 25 baht per tree – and farm decline would still be a problem without routine control measures. Growers set a portion of their land aside for new planting once the decline sets in, leading to low productivity. Tree age on a farm will range from three or four to twelve years.

***Varieties.*** CV Tongdee (brilliant gold Pummelo) and CV Kao Nam Pueng (white honey Pummelo) differ in the time taken to ripen and in their appearance, yield, quality and resistance to adverse environmental conditions, disease and insects. Most farms grow both varieties, in a proportion of about 60 to 70 percent of the pink-fleshed CV Tongdee, which is hardier and a preferred variety for export, to 30 to 40 percent of the larger, white-fleshed CV Kao Nam Pueng, which is a preferred variety on the domestic market and is more highly priced.

Fruit are thinned when they are the size of a small lime, so that the remaining fruit on the tree can reach a larger size for the market. The number of fruit left per tree differs depending on variety. In the case of CV Tongdee, an average of 40 to 60 fruits is left per tree, inasmuch as fruit size is significantly smaller when more than 100 fruits are allowed to ripen per tree. In the case of CV Kao Nam Pueng, an average of 20 to 40 fruits is left per tree (but certainly fewer than 50). CV Tongdee fruit grown in Nakornchaisri relies mainly on export. CV Kao Nam Pueng has lower yields and is less hardy.

***Farm care and material inputs.*** With reasonably good farming practices, pummelo orchards require replanting about every 12 to 15 years, depending on the cultivars used and general orchard management. Replanting is a major additional cost. In general, CV Tongdee is more tolerant under adverse growing conditions. A well-managed farm planted to CV Tongdee may maintain its productivity for 20 years or even longer.

Chemical fertilizer is used extensively, but organic manure (from cows) is also used on all the farms surveyed. A simplified chemical fertilizer application is 1 kilogram for a one-year-old tree, 2 kilograms for a two-year-old tree and 3 kilograms for a three-year-old or older tree. The time of application is very important in order to regulate flowering, the subsequent setting of fruit, the various stages in fruit development and post-harvesting. Various chemical fertilizer formulae are used during different stages of development. When nitrogen is abundant, vegetative growth is vigorous and unfruitful. Fruit starts to form with fertilizer application and the foliar spray of nutrients after a dry spell when vegetative growth is low. After the fruit sets and during its development, the complete 1:1:1 fertilizer formula is used. The supply of nutrients to the fruit eventually checks or stops vegetative growth. After harvesting, the complete fertilizer formula is used again. An excessive supply of nitrogen is seldom a problem in the Nakornchaisri zone, since root systems tend to be restricted because of the high water-level in the beds. A sudden increase in the supply of nitrogen, either from the application of fertilizer or from rainfall during fruit development, is likely to result in fruit with thick peel or puffiness – one of the problems affecting pummelo quality in other growing regions in the country.

Copper compounds, particularly copper oxychloride, are the most commonly used fungicides for citrus fruit, supplemented with other insecticides and fungicides in one spray mixture. The most popular pesticides used are abametin, lannat, dimethoate, dichlorate and cypermetrim, and a range of fungicides and bactericides, normally mixed together in one application. Many types of sprayer are in use, from small hand equipment to a specially designed multiple-head sprayer installed on a small boat and sprayed into the trees as the boat travels along the channels.

***Harvest maturity.*** CV Tongdee should be harvested eight to nine months after flowering, when the oil glands on the peel become more prominent and less dense at the blossom end and before the flesh becomes dry and corky at the stem end. CV Kao Nam Pueng is harvested seven to eight months after flowering.

***Harvest season.*** In the case of CV Tongdee, there is often a small crop in February to March, with the main crop in August to September. For a fairly good-sized farm of about 10 rai, harvesting lasts from a few days to no more than two weeks. Kao Nam Pueng flowers repeatedly, so that fruit are selectively harvested throughout the year.

In the Nakornchaisri GI zone, land prices are becoming prohibitive and are one of the main constraints on expansion of production in the area. The national average rent for farmland is about 500 baht per year, but in the GI zone the rate can be as high as 1 000 baht per rai or even 2 000 baht for prime land. Leases are often for three years, with an option to renew for up to ten years. Most growers who seek to rent farms to grow pummelos once worked as hired hands on established farms. They therefore have only basic farming skills, but lack

experience in farm management and in marketing. Taking advantage of lower land rent and cheaper labour in other regions of the country, increasing numbers of Nakornchaisri growers are migrating to new regions to grow pummelos or are making contracts with existing pummelo farms to grow and sell pummelos.

Most farms rely on family labour because of the small farm size and also because routine care for pummelos is not very labour intensive. As and when needed, extra help can be arranged through labour sharing with neighbours or contracting labour for initial land preparation, erosion and flood prevention, scheduled spraying, weeding or harvesting. The present cost of labour is 300 to 400 baht per day, well above the average of 150 to 175 baht in other regions.

## Seasonal variations in farmgate prices

Seasonal variations in farmgate prices for CV Tongdee and CV Kao Nam Pueng of various sizes (baht/kg) are shown in Tables 5 and 6. Pummelo prices have fewer seasonal variations than other more perishable seasonal fresh fruit. The farmgate prices for Nakornchaisri pummelos would be at least 20 to 30 percent higher than those listed in the table. At the time of the interviews (May 2007), the farmgate price for a 17-inch fruit was 25 to 27 baht. The average farmgate price paid by exporters in 2006 was 23 baht per piece.

***Table 5. Seasonal variations in farmgate prices (baht) of CV Tongdee of various sizes, 2001-2005***

| Year | Size | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | J | F | M | A | M | J | J | A | S | O | N | D |
| 2001 | Large | | | | | | 12.00 | 12.00 | 12.00 | 12.50 | 11.50 | 10.00 | 10.00 |
| 2003 | Large | 8.0 | 10.0 | 15.67 | 18.22 | 18.50 | 12.20 | 16.25 | 19.33 | 13.00 | 14.58 | 15.08 | |
| 2005 | Large | 11.70 | 12.42 | 10.84 | 8.66 | 11.23 | 13.68 | 13.37 | 12.52 | 11.37 | 11.94 | 12.04 | 10.51 |
| 2001 | Small | | | | | | 8.00 | 5.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| 2003 | Small | 6.00 | 6.66 | 10.00 | 12.00 | | | 8.00 | | | 11.00 | | |
| 2005 | Small | | 4.00 | 4.66 | 5.66 | 7.60 | 7.50 | 6.50 | 5.00 | 6.00 | 6.00 | 6.13 | 7.37 |
| 2005 | Mixed | 8.81 | 8.62 | 8.37 | | 10.00 | | | 5.46 | 7.00 | 7.00 | 5.00 | |

***Table 6. Seasonal variations in farmgate prices (baht) of CV Kao Nam Pueng of large and mixed sizes, 2004-2005***

| Year | Size | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | J | F | M | A | M | J | J | A | S | O | N | D |
| 2004 | Large | | 14.37 | 14.75 | 14.00 | 13.00 | 13.00 | 16.58 | 17.45 | 15.34 | 15.29 | 15.10 | 15.81 |
| 2004 | Mixed | 12.87 | 12.50 | 12.75 | 12.67 | 11.95 | 12.87 | 13.19 | 15.66 | 13.83 | 12.00 | 14.00 | 13.25 |
| 2005 | Large | | 19.17 | 16.00 | 14.33 | 17.00 | 15.00 | 15.00 | | | | | 16.67 |
| 2005 | Mixed | 14.50 | 16.37 | 15.25 | | 16.00 | | 7.00 | 7.00 | 5.00 | 5.00 | 5.00 | |

Bangkok wholesale market prices are not affected by farmgate prices, as can be seen from Table 7 on seasonal variations in Bangkok wholesale prices of CV Tongdee pummelos between 1999 and 2007.

***Table7. Seasonal variations in Bangkok wholesale prices of large and small fruit, 1999-2007***

| Year | | Month | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | F | M | A | M | J | J | A | S | O | N | D |
| Large fruit | | | | | | | | | | | | |
| 1999 | 40.25 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 |
| 2001 | 24.40 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 | 27.50 |
| 2003 | 33.41 | 40.00 | 40.00 | 40.00 | 38.16 | 33.33 | 30.00 | 30.00 | 30.00 | 25.67 | 22.65 | 21.21 |
| 2005 | 24.00 | 30.17 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 28.50 | 26.14 | 22.50 |
| 2007 | | | | | | | | | | | | |
| Small fruit | | | | | | | | | | | | |
| 1999 | 17.80 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| 2001 | 13.48 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 |
| 2003 | 23.32 | 27.50 | 27.50 | 27.50 | 25.66 | 20.83 | 17.50 | 17.50 | 17.50 | 13.89 | 11.15 | 9.29 |
| 2005 | | 20.61 | 22.50 | 22.50 | 22.50 | 22.50 | | 22.50 | | 18.25 | | |
| 2007 | | | | | | | | | | | | |

## Supply chain and type of marketing relationships among stakeholders

***Table 8. Supply chain and type of marketing relationships among stakeholders***

| GI-designated area | | | Rachaburi |
|---|---|---|---|
| Grower | | Grower | Grower |
| Domestic | | Export | Domestic |
| Sales to local market | Long-term trading relationships with local markets, which sell to people from towns or to visiting tourists | Long-term informal relationships with consolidators, who have long-term formal relationships with exporters. Consolidators move about the country to obtain supplies. After on-farm pre-grading, they may provide transportation from farm to packing plant. The purchase price is set by the exporters and consolidators are paid on a commission basis. | Sales to local market |
| Sales to visiting traders | *Either* spot arrangements during the harvest season when traders come with truck to pick up produce, or through long-term arrangements with traders who organize transportation | Packing plants operated by the exporter. Inspection, grading, cleaning, waxing, packaging and final loading into the container | Sales to visiting traders |
| Sales via wholesale market | Only large growers with large quantities sell to wholesale markets in other provincial towns or Bangkok | | Sales via wholesale market |
| Roadside stalls | Roadside to tourists | Farmers' roadside stalls, direct sale | Roadside stalls selling to tourists |
| Peri-urban markets | Usually to a group of large fruit stalls commonly located on the outskirts of Bangkok | Through local traders, long-term relationship | Peri-urban markets |

## Price formation and gross margin of stakeholders along the supply chain

Several factors were identified as affecting price formation to varying degrees and are described under the various headings below.

***Export as a factor in price formation***

***Table 9. Monthly exports of pummelos, 1999-2007***

| Month | 1999 | | 2001 | | 2003 | | 2005 | | 2007 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Volume (tonnes) | Value (1 000 baht) | Volume (tonnes) | Value (1 000 baht) | Volume (tonnes) | Value (1 000 baht) | Volume (tonnes) | Value (1 000 baht) | Volume (tonnes) | Value (1 000 baht) |
| J | 357 | 3 547 | 334 | 5 781 | 410 | 6 455 | 227 | 3 369 | | |
| F | 157 | 3 834 | 40 | 951 | 139 | 2 055 | 133 | 4 110 | | |
| M | 26 | 360 | 294 | 4 831 | 436 | 7 823 | 168 | 4 781 | | |
| A | 92 | 1 326 | 210 | 3 928 | 563 | 10 269 | 257 | 8 078 | | |
| M | 372 | 5 870 | 186 | 2 184 | 434 | 7 226 | 345 | 7 071 | | |
| J | 202 | 6 916 | 268 | 4 990 | 507 | 10 845 | 538 | 10 785 | | |
| J | 391 | 9 544 | 546 | 9 134 | 559 | 10 227 | 679 | 13 003 | | |
| A | 1 349 | 20 502 | 1 257 | 20 457 | 2 050** | 25 149 | 1 015** | 16 774 | | |
| S | 2 608** | 45 176 | 2 712** | 38 142 | 1 453** | 23 238 | 1 116** | 12 734 | | |
| O | 135 | 2 547 | 244 | 2 351 | 374 | 5 123 | 514 | 5 385 | | |
| N | 248 | 2 769 | 242 | 4 425 | 389 | 3 812 | 519 | 5 344 | | |
| D | 120 | 1 089 | 236 | 4 351 | 306 | 1 896 | 275 | 8 232 | | |
| Total | 6 431 | 10 3467 | 6 573 | 101 530 | 7 606 | 114 124 | 6 292 | 99 672 | | |

Note: ** Peak export season

Exports are a major driving force in price formation and are the single most important determinant for pummelo prices in GI-designated zones. This is especially true for CV Tongdee, because pummelo exports to Hong Kong are based mainly on this cultivar.

At the packing plant, the purchase price is paid on a "per fruit" basis, depending on quality and size. The price has not fallen below 20 baht per piece for several years and has sometimes risen to as high as 45 baht per piece. Peak export demand is in August and September, although recent years have seen a gradual increase in demand during other months. Available supplies in the Nakornchaisri zone are limited, and sourcing from alternative supply bases in other regions of the country to ensure a year-round supply will increase. Fruit quality from these new sources is already improving.

***Geographical indications.*** GI registration is a major factor in high prices. With regard to exports, the purchase price and quality of Nakornchaisri pummelos have been used as benchmarks for fruit from other regions. CV Tongdee fruit from Nakornpathom (GI-designated areas) receive 2 to 4 baht more than fruit from Phetchaburi or other areas of almost equal quality. Supplies from other regions of the country are growing. In markets, consumers are paying a higher price for fruit claiming to be from Nakornchaisri, even when there are some reservations about the true origin of the fruit. Traders rely mainly on consolidators to guarantee the production area. This close long-term working relationship between exporters and consolidators is a key success factor in establishing a trader's reputation.

***Preference as to variety.*** The preference of domestic demand as to variety has changed as new cultivars have started to appear on the market. The most popular varieties on the

domestic market are Kao Nam Pueng, Kao Daeng Gua and Kao Phuang. All these cultivars have whitish to yellow pulp. They are medium to large fruited cultivars and are well-accepted by markets in Bangkok, and some consistently receive higher prices than CV Tongdee. A high price is guaranteed for CV Tongdee especially during the peak export season in late August as it is the favourite variety for export to Hong Kong.

***Appearance.*** It is very important for pummelos to meet minimum visual requirements. The most common defects leading to lower prices – or to almost unsaleable fruit – are surface blemishes of various kinds, sunburn, sooty mould, external damage caused by insects or disease, odd shapes, sizes not complying with standards, thick peel, light feel when picked up, puffiness, underripe fruit, overripe fruit and peel colour more yellow than green. If the taste is acceptable, such fruit can still end up in the ready-to-eat packs that are now increasingly available in city stores. Urban retailers peel and pack the fruit for these ready-to-eat packs, and the price is set at an average of 25 baht for a 200- to 300-gram pack.

***Size difference.*** Fruit is always sold by the piece rather than by weight, with larger fruit receiving higher prices. As can be seen from the table below, fruit that is size graded receives a higher price and suffers smaller seasonal price fluctuations than fruit of mixed sizes. In the case of exports, price differences due to size differences are significant at the farmgate. It is an established practice for packing plants to purchase fruit based on circumference. For the export market, fruit larger than 20 inches or smaller than 14 inches is rejected, but may still be acceptable for the domestic market. Price differences for different sizes at the farmgate and in Bangkok wholesale markets are shown in Table 10.

***Table 10. Comparison of prices (baht) of pummelos of various sizes at the farmgate and in the Bangkok wholesale market, 2005***

| | | CV Tongdee | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | J | F | M | A | M | J | J | A | S | O | N | D |
| 2005 (farmgate) | Large | 11.70 | 12.42 | 10.84 | 8.66 | 11.23 | 13.68 | 13.37 | 12.52 | 11.37 | 11.94 | 12.04 | 10.51 |
| 2005 (Bangkok) | Large | 24.00 | 30.71 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 32.50 | 28.50 | 26.14 | 22.50 |
| 2005 (farmgate) | Small | | 4.00 | 4.66 | 5.66 | 7.60 | 7.50 | 6.50 | 5.00 | 6.00 | 6.00 | 6.13 | 7.37 |
| 2005 (Bangkok) | Small | - | 20.61 | 22.50 | 22.50 | 22.50 | 22.50 | - | 22.50 | - | 18.25 | - | - |
| CV Kao Nam Pueng | | | | | | | | | | | | | |
| 2005 (farmgate) | Large | | 19.17 | 16.00 | 14.33 | 17.00 | 15.00 | 15.00 | - | - | - | - | 16.67 |
| 2005 (farmgate) | Mixed | 14.50 | 16.37 | 15.25 | - | 16.00 | - | 7.00 | 7.00 | 5.00 | 5.00 | - | - |

***Price fluctuations from year to year.*** To obtain a picture of yearly price fluctuations for pummelos, it is necessary to look at long-term trends over a five- to seven-year cycle because newly planted trees take at least four years to become productive and fruit harvested during the first two years is usually of poor or unreliable quality. From 1982 to 1992 the farmgate price remained stable at 11 to 13 baht per kilogram. The farmgate price then rose to more than 15 baht per kilogram from 1997, remaining high until 2002. The price increase then led to an increase in supplies, with total production rising from 121 000 tonnes in 1997 to 267 000 tonnes in 2002. This led to a fall in price to less than 10 baht in 2003 and 7.38 baht in 2006. Low farmgate prices do not appear to have been reflected in Bangkok wholesale prices.

***Seasonal price changes.*** As compared with other more perishable fresh fruit with a shorter shelf life, pummelo prices are less affected by seasonal variations (see Table 10 above). Prices are more affected by export demand or demand during festivals, particularly the mid-autumn festival, Chinese New Year etc.

***Different market segments.*** Prices are affected by the delivery distance from production areas, although to a lesser extent than in the case of more perishable fresh fruit. Retail prices are more affected by market location and are two to three times higher on markets in high-income areas. However, growers selling fruit to the high-end market or modern trade outlets do not necessarily enjoy the price premium that stores charge their customers.

***Growers' reputation and innovative marketing skills.*** Individual growers' reputations are also a factor in price formation. Although this is still more the exception than the rule, it is becoming a more influential element.

## 3. Lessons learned

1. Pummelos are a favourite fresh fruit among Thai people, most of whom consider it a high-priced fruit. The country's total annual production has stood at about 250 000 tonnes in recent years, with exports accounting for less than 10 percent of the total. Thailand has a history of exporting pummelos (CV Tongdee), especially to Hong Kong, where there is a group of loyal, enthusiastic consumers.

2. Overproduction is almost impossible because of the restricted geographical conditions required to grow pummelos. After years of high prices, production has expanded from the central region to the south, north and northeastern regions. However, it should be borne in mind that many new farms are not yet productive and fruit from most farms is not of export quality. Even for domestic consumption, farms with only 30 to 50 percent tradable fruit are common rather than the exception.

3. Pummelo production was first introduced into Samphran District and spread naturally to surrounding areas. The main production areas in the central region of the country are in Nakornpathom Province. Nakornchaisri District and neighbouring Samphran District are considered prime pummelo production areas. Nakornchaisri has a long established reputation for quality pummelo production, and it can be said that pummelo exports from Thailand are linked to the fame of the Nakornchaisri name. Fruit grown in Nakornchaisri depends more on exports than fruit grown in any other region. Growers in the Nakornchaisri zone enjoy an almost guaranteed market and a price premium for their fruit. Consumers have long appreciated the quality and reputation of Nakornchaisri pummelos, especially CV Tongdee, which has a long cultivation history in the area.

4. The application for GI registration for Nakornchaisri pummelos was made by the Nakornchaisri Chamber of Commerce. GI registration was limited to growing regions in Nakornchaisri, Samphran and Puttamonton Districts for two cultivars, CV Tongdee and CV Kao Nam Pueng. The registration process was initiated to provide protection to the Nakornchaisri pummelo name for growers in the region.

5. Some unique traditional farming practices are used for pummelo production in Nakornchaisri. Pummelo trees naturally grow well on the low-lying land along the river,

which is rich in organic deposits. There are few adverse temperatures and humidity fluctuations. As the orchards age and the trees mature, growers tend to use less chemical fertilizer and more organic fertilizer. Fruit quality is stable and reliable. Moreover, highly specialized skills have been developed to adjust the harvest season to meet peak export demand. The marketing networks in the area are already functioning efficiently, with established price structures and marketing costs, and profits are maximized to the benefit of both growers and traders.

6. In neighbouring Rachaburi Province outside the GI-designated area, farming is based on a totally different concept. The land is famous for mangos, coconuts, grapes, a whole range of other fruit and orchids. Farming is based on more sustainable practices, with low inputs and intercropping with various crops. Pummelo production is not the main source of income, production costs are low and yields per rai are probably some of the lowest in the country.

7. The cost of pummelo production in GI-designated districts remains lower than the national average. The major cost items are material inputs, mainly fertilizers and agricultural chemicals such as insecticides, fungicides and other foliar sprays containing nutrients, trace elements or growth promoters. There are also the costs incurred for fuel and hired labour. The amount spent on activities to prevent flooding and erosion of the channels and beds has increased each year.

8. Pummelo farms are less labour-intensive than other types of fruit farm. Since the majority are small, family labour is almost exclusively used. Labour costs are high in the area, and if hired labour is used, this is only for specific activities under contract.

9. CV Tongdee is a cultivar particularly favoured by Nakornchaisri growers, since it is more tolerant of adverse conditions (flooding, saline water, disease etc.) and has fewer nutritional requirements, while its productivity is higher than that of CV Kao Nam Pueng. Growers use their traditional farming systems to grow a cultivar that meets consumers' preferences in terms of variety, developing techniques to adjust the time of the harvest and attract traders' or exporters' interest in order to form effective sourcing networks.

10. The Nakornchaisri farmgate price for a 16- or 17-inch fruit seldom falls below 20 baht, with a retail price ranging from 25 baht to over 70 baht. In conclusion, two major factors – the consistent quality of the fruit and the concentration of pummelo farms in the Nakornchaisri zone – make sourcing and marketing efficient. Growers' high profits are a result less of high yields than of the high price received for the fruit.

11. Prohibitively high land prices in Nakornpathom Province have acted as a constraint on the expansion of new orchards in neighbouring areas with similar geographical conditions, and led to the migration of skilled growers from Nakornchaisri to other parts of the country, either to establish new farms or to lease established pummelo farms. An interesting development in the export trade is that supply bases have expanded greatly in recent years, with quality fruit increasingly being sourced from as far as the southern and lower northeastern regions of the country.

12. Pummelo production has expanded, for example, to Petchaburi and Chumporn in the south, the lower eastern region and the northern part of the country. Some 25 to 30 percent of new pummelo farms are not yet productive. Despite the expansion and the

possibility of new supply sources, there are still problems to be solved over unreliable fruit quality and over an inability to adjust the time of harvesting to meet peak export demand. New farms receive too much fertilizer, and fruit harvested during the first two years is usually of very poor quality. Older trees receive too little fertilizer and too much chemical spray. The quality is inconsistent and there are tell-tale signs indicating the real production area. With the recent downward trend in overall pummelo prices, there will be little incentive for these new farms to improve their farming practices.

13. Sourcing from areas outside GI-designated zones is for experienced traders only. Supplies from other parts of the country of a quality almost on a par with Nakornchaisri GI fruit have increased recently. It seems that "Nakornchaisri pummelo" is seen more as a generic term associated with a certain quality than as indicating a specific link to a geographical zone.

14. The recent application for GI registration for Nakornchaisri pummelos was made by the Nakornchaisri Chamber of Commerce in order to protect the name and reputation. The initiative was based on the unique geographical conditions of the area, the traditional farming practices, the recognized and reliable quality of the fruit and a loyal group of consumers. However, the majority of growers are poorly organized and poorly informed on the pros and cons of GI registration. Commercial operators, traders and exporters also express reservations on GI implementation, so that there is little sense of urgency regarding progress in this connection.

15. Pummelo production in GI-designated areas has decreased in recent years and its market share is shrinking, factors that have militated against the formation of any organization to ensure compliance with GI requirements.

16. Although there is still a general recognition of the geographical link with a certain quality and reputation, it is becoming tenuous. The GI application contains no specific implementation plan to ensure compliance with requirements. Moreover, traders supplying both the domestic and export markets welcome opportunities to obtain additional supplies from outside the Nakornchaisri zone in order to reduce costs.

## 4. Recommendations

1. The GI registration of Nakornchaisri pummelos should involve stakeholders all along the supply chain and should take into account how the fresh produce trade operates.
   - *Growers.* Nakornchaisri growers have long enjoyed an almost guaranteed market and a high farmgate price for their pummelos, and there is a well-established marketing network in growing areas. Although there appears to be a major gap between farmgate and domestic wholesale prices, this is less the case with pummelos produced in GI-designated areas. The gap can be explained partly by transportation costs, storage rental, the low turnover rate etc. Growers are currently poorly informed and poorly organized regarding the GI issue.
   - *Traders.* The supply of pummelos from Nakornchaisri is fairly limited and fruit is usually so expensive as to be out of reach of most local consumers. Traders for the domestic market would obviously prefer to avoid confining their supplies to a few thousand tonnes of high-priced fruit from Nakornchaisri. There are therefore considerable doubts and reservations as to the benefits of GI registration for the trade

or the traders. Nakornchaisri GI pummelos rely on the export trade. Although success in exporting fresh produce involves more than the use of a GI name, the importance of the GI name and reputation in the export market should be measured.

- *Consumers.* The capacity of GI registration to provide protection against consumer deception with non-GI pummelos is probably more easily understood. Consumers have long appreciated the quality and reputation of GI fruit and probably associate high prices with the GI mark. The price can be as high as 60 or 80 baht for a single fruit, and consumers are reluctant to pay such a high price or to purchase GI fruit on a regular basis. Moreover, consumers have the choice of increasing numbers of other cultivars producing good to excellent quality fruit in other regions. The high retail price of GI pummelos may reduce purchases by consumers.

All these factors lead to a lack of any real progress on application of the GI system in the Nakornchaisri zone.

2. A national approach is required in order to pursue implementation of GIs in Thailand. The specific quality of Thai pummelos and their reputation in overseas markets should be assessed in order to consider the potential for GI protection. However, this would perhaps fall under a brand-focused strategy and would require in-depth discussion of the pros and cons among researchers and communication of this decision-making process to stakeholders along the supply chain.

3. Lastly, implementation of the GI system requires some control measures and systems. These have not yet been discussed by any of the stakeholders, but their establishment should be the next major step in guaranteeing the specific quality linked to the origin of Nakornchaisri GI pummelos.

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# Conclusion: synthesis and recommendations

This section synthesizes the main lessons learned from the six case studies of Asian GIs, together with the resulting recommendations and their implications. Some elements from the conclusions of the Technical consultation on rural development and agricultural and food quality linked to geographical origin (Quality&Origin), organized in Bangkok in June 2009 by FAO, the European Commission Delegation to Thailand and the Department of Intellectual Property of the Thai Ministry of Commerce, have also been inserted to complement the findings of the case studies.

## 1- Synthesis

### Institutional context

One major finding regarding the institutional context is that when the law allows individual persons or companies to register a GI, there is a danger that stakeholders traditionally involved in the production and processing of a GI product will be left out and prevented from receiving the benefits of their knowledge and practices because the GI is protected for a sole user. This defeats the purpose of GIs of protecting a *collective* intellectual property to benefit all producers located in the delimited GI area and producing the specific-quality product. Indeed, a GI product is the outcome of the traditions and know-how of many people in the zone over a long period of time. It is tied to a community and has a heritage dimension. The name and reputation of the product on the market cannot be the property of a single private actor or even a consortium of actors if it excludes other legitimate actors. A collective and participatory approach is therefore required in order to promote and protect a GI.

This is illustrated by the case of Uvs sea buckthorn (Mongolia), in which a single company registered the GI individually, without any prior consultation between local stakeholders to agree on common rules (a code of practice) for use of the GI. The Bangkok technical consultation on quality and origin identified similar situations in Thailand, for example in the case of Petchabun tamarind. Thus, if whole communities that have developed or inherited intrinsic knowledge are to benefit from GI registration, countries interested in building an appropriate institutional context for GIs should ensure that such registration is a collective undertaking by all the stakeholders willing to be involved in the marketing chain of the product in question.

The second important institutional lesson learned from the Uvs sea buckthorn case is that laws on GIs should make the existence of a code of practice for a product a prior condition for registration. A code of practice constitutes the voluntary standard that defines the specific quality of the product, justifying the link to the specified area and providing the production rules subscribed to by all the GI producers. Without a code of practice developed in a coordinated way among the various stakeholders involved in the production and marketing chain, there is a danger that the geographical indication will be used to designate various types of product or various levels of quality, thus creating consumer confusion and distrust, and damaging the GI reputation. A similar situation was illustrated by the case of

Nakhonchaisri pummelos, where the indication is used by traders to refer to a superior quality product but not necessarily one coming from the Nakhonchaisri region. On the other hand, the codes of practice set up in the case of Bali Kintamani coffee and Kampong Speu palm sugar were carefully drawn up and agreed upon by all the producers involved. This participatory approach has led to a precise definition of the specific quality that can be the basis for added value on the market, a common vision and strategy shared by all the stakeholders involved, and the implementation of a local control system to guarantee conformity with the code of practice, all of which are key factors in ensuring sustainability.

Lastly, the case studies show how coordination among public institutions at national and local levels is essential for the successful implementation and protection of a GI system. The Chinese case illustrates the ambiguity of implementing two or more different GI standards, each with its specific registration process, identification label and target public: there are double procedures for producers who wish to register under both systems, and also various different products for a single GI, creating consumer confusion.

All the cases recommend or show the importance of having local authorities involved from the start in identifying their region's natural resource potential and in implementing national laws and regulations regarding GI products. Many governments of Asian countries have developed national strategies for GIs without informing the local level about their potential for sustainable economic, environmental and social development, thus failing to encourage local authorities to adopt the concept and participate more enthusiastically in its implementation. Another important role of public authorities concerns consumer information and guarantees, in order to ensure the credibility of the GI label (i.e. controls) and increase understanding of it, thus contributing to the economic success and sustainability of local GI systems.

## Geographical zone and its specific resources

Another lesson learned is that a detailed inventory of the geographical zone, its specific natural resources and the local practices involved in the origin-based product are all necessary to ascertain the uniqueness and specific quality of the GI product, and also to justify the link between specific quality and origin, thus legitimizing legal protection of the GI in question. Governments of countries interested in adopting the GI tool should make use of the scientific expertise available in their country or region in order to record the potential of their various geographical zones in terms of natural and knowledge resources. Scientific studies, historical data, inventories and descriptions of resources, and market studies are all important elements to help first in identifying GI potential and market potential, and second in defining the product specifications and justifying the link between specific quality and geographical origin. This is particularly well illustrated by the Bali Kintamani coffee and Kampong Speu palm sugar cases, with the establishment of an international and national scientific team to define the product and identify how its quality was linked to its geographical origin. Similarly, the cases of Darjeeling tea and Jinhua ham show how important careful documentation of traditional knowledge and history is in legal definition of the product, as set out in a code of practice.

## The product

Although the case studies presented in this document refer to food products, it is important to note that the TRIPs Agreement allows GI registration to cover handicrafts and other

traditional non-food products. This trend was identified by the experts at the Bangkok technical consultation on quality and origin in Asia. Asian countries are thus experimenting with the potential use of GI systems not only to protect and support both edible and non-edible products, but also to contribute to the sustainable development of rural areas. This innovation should be highlighted.

The present case studies confirm that the marketing potential of a GI label can be fulfilled only if the product is truly of a quality differentiated from the mainstream product, and if this quality has attributes linked to its geographical origin. The product must also meet basic compulsory requirements before it can be placed on the market, in particular in terms of food safety. In order to become a real asset, this specific quality linked to geographical origin must be monitored and certified, using a robust quality control system. Both the Bali Kintamani coffee and the Kampong Speu palm sugar cases show the importance of the control plan associated with the code of practice, in which self-monitoring by producers is the basis of the guarantee provided to buyers. Although these two case studies were carried out very soon after the start of the respective GI processes, they found that when the product registered under a GI system does indeed demonstrate a specific quality, as opposed to the generic product, and when consumers trust the quality sign being used and its label, thanks to a rigorous quality control system, there is the potential for increased prices at both farmgate and processor level.

Innovation and investment in improving the quality characteristics of GI products should be encouraged so as not to disappoint consumers who are expecting a quality eating experience. Innovations to adapt the attributes to modern consumption expectations are always possible, provided that they are in line with the image of the GI product. In the case of Bali Kintamani coffee, for example, growers identified the importance of drying methods in relation to the coffee's taste quality, and they decided to change their processing technique to improve the quality of their roasted coffee beans. Producers of Kampong Speu palm sugar took the opportunity of the GI process to improve the overall quality of their product in order to meet market requirements and expectations. As a consequence, they adopted a code of practice that required technical progress from a majority of producers, but with the intention of supporting these producers' progress so that they could meet the requirements within a specified period. Similarly, a majority of Darjeeling tea gardens are in the process of converting to organic farming in response to consumer demand for environmentally friendly practices.

## The stakeholders and the GI process

A very important lesson learned for stakeholders and for implementation of a GI process is the advantage of creating a GI organization that groups together the various actors likely to be involved in the production and marketing chain – farmers, processors and distributors, depending on the particular circumstances. This organization is essential in order to take collective decisions on how the code of practice for the product is to be defined (requirements, geographical delimitation of the production zone, indicators for the guarantee system, and controls) and to design collective actions for the marketing and management of the GI. Such actions will concern negotiation of marketing conditions and value sharing, development of collective communication tools, implementation of the control plan, supply of various marketing or production services to producers, and representation of the GI value chain with regard to consumers and public actors. The cases of Bali Kintamani coffee and Kampong

Speu palm sugar are very good illustrations of the advantages that such a stakeholder coordination structure can provide. The decisions taken are shared by all the stakeholders, leading to a real strategy that improves the value of the GI product. On the other hand, the problems arising from the lack of such an organization are obvious in the cases of Uvs sea buckthorn and Nakhonchaisri pummelos: no real strategy can be achieved and decisions are blocked or hampered by conflicts between stakeholders with varying interests. In such situations, the GI tool is not used to its full potential.

## Benefit of external support

Throughout the case studies, external support appears as a common element, albeit to varying degrees. Such external support covers the supply of specific knowledge and capacities by actors outside the local value chain, often facilitators from the scientific, academic, development and cooperation fields. External support is particularly structured in the cases of Bali Kintamani coffee and Kampong Speu palm sugar, where projects involving proactive government offices and national and foreign public research agencies have been designed to support producers at all stages of GI implementation: identification of the product potential, elaboration of the code of practice, including a control plan and its implementation, creation of the GI group, training and information of the stakeholders, marketing etc. External support should be designed in such a way as to empower producers for GI management and decision-making, so that the whole process is sustainable and can continue to develop on its own when such external support inevitably comes to an end.

## Marketing issues

All the cases illustrate the problem of misappropriation, with GIs being used by stakeholders who are not entitled to do so and who usurp the genuine users' intellectual property rights and the reputation they have built up. This is seen in various contexts: at the international level in the case of Darjeeling tea, at the regional level in those of Nakhonchaisri pummelos and Uvs sea buckthorn, and at the national level in those of Jinhua ham and Kampong Speu palm sugar. The good reputation built up by the GI producers has to be protected effectively and jointly by the government and private sector stakeholders. Protection and boosting of the GI reputation thus require an effective law enforcement system for legal protection, awareness-raising among consumers, and investment in marketing and promotion by the industry stakeholders themselves, so that customers and consumers are put in a position to recognize the distinctive quality of the GI.

Moreover, it is important to note that a GI strategy can be complementary to other quality improvement schemes, such as organic or fair-trade promotion. GI operators who have followed such a strategy appear to have boosted the reputation of their product by associating it with another quality sign that currently enjoys better consumer awareness or addresses environmental and social expectations. This is seen particularly in the cases of Darjeeling tea and Kampong Speu palm sugar. In other cases, socially and environmentally friendly practices are included in the code of practice as part of the definition of the GI, and in such cases it is important to communicate these attributes to consumers, for example the fact that Uvs sea buckthorn is collected as a wild species in a pristine environment with no use of chemicals, or the fact that Jinhua ham is intrinsically associated with a traditional pig breed that deserves to be preserved for reasons of biodiversity.

Another marketing strategy that can boost the reputation of the product and also that of the zone as a whole is the forging of linkages with tourist products and services. Such a strategy presupposes the development of a territorial approach with other local actors, so that they can provide information jointly on the destination and the GI zone, and encourage the offering of GI products and direct sales at tourist sites and in accommodation and restaurants. Such a strategy is seen in the case of Darjeeling tea, where there is the intention to develop facilities to welcome consumers and tourists to tea gardens, and also in that of Bali Kintamani coffee, where the zone is also an important international tourist destination.

In conclusion, and in line with the technical consultation held during the Quality&Origin event in Bangkok, GIs have been recognized as a tool for rural and agricultural development in Asia, in relation to the potential identified in these countries (existing specific origin-based quality products and the capacities of a GI system to structure a value chain and create value). However, it is not some magic wand, inasmuch as circumstances have to be taken into account – which is why two levels of recommendations can be seen, as summarized below.

# 2- Recommendations

Based on these discussions and analysis, the following recommendations are addressed to governments and supportive organizations concerned by GI development, at two levels:

a. The legal and institutional frameworks and capacities, in relation with evaluation, registration and protection of GIs at national level;
b. At the local level, in relation with setting up and managing a particular GI product.

## a. Legal and institutional recommendations

The governments should provide a clear and correct definition of what a GI is and the conditions for application that enhance their contribution to rural development, but they should also integrate some support policies to strengthen GI contribution to rural development.

**Registration and protection**

Legislation should provide a clear and correct definition of a geographical indication as a collective intellectual property right in line with TRIPS as a minimum legislative framework, including some clear conditions for applications. A regional approach could be enhanced by continuing to share views between countries, and other regional seminars, study tours and regional projects should be supported.

As for the conditions of application, the code of practice and the collective approach are two main elements to be considered. As discussed, GIs cannot be the property of a single private actor or even a consortium of actors if it excludes other legitimate actors. Thus the legislation and registration procedure should ensure a collective and participatory approach to benefit all legitimate stakeholders, by ensuring that the applicant is a collective organization that equitably represents all potential stakeholders in the GI.

In addition, the intellectual property rights reserved to a community who apply for a geographical indication must be justified by the specific quality or the reputation linked to the product's geographical origin. This application should then be supported by a code of practice, or specifications, that demonstrate the link between the specific quality or reputation and the geographical origin, and list the requirements to be followed by producers to reach this

specific quality so as not to mislead consumers. Again, the legislation on GI should request such a document and the associated guarantee system, whether public or private (plan of control and verification or certification system). Indeed, a cost-effective control system to avoid usurpation should be set up, considering the respective role of private and public stakeholders in an efficient guarantee system. This control system may then prevent infringementby ensuring *ex officio* protection and enforcing sanctions. In this view, the government should also provide guidelines and criteria for the accreditation of certification bodies (public or private), taking into account the international accreditation rules.

As a consequence, the registration procedure should allow the assessment of the request, upon the following criteria: specific product quality linked to geographical origin, a collective approach to GI setup and registration, fair compromise among stakeholders and protection against infringement. This requires an expertise for the assessment of registration applications to be developed, based on a code of practice. In this regard, governments should provide capacity building  such as training or exchanges with other assessment systems already in operation to their personnel in charge of such assessments.

The coordination between sectors involving several institutions and experts from the ministries in charge of agriculture, food safety, trade etc. is also very important so as to build consensus on the registration process and enforcement, and some coordination structure has to be set up, either thanks to a central interministerial planning body responsible for a national GI development strategy, or through a national commission gathering representatives of various concerned ministries, other institutions and national experts. This body will assess registration and provide recommendations on GI policy development to the national authority in charge of GIs. The coordination should also be made with the different administrative levels: it is very important to involve local authorities in the support of the GI concept, GI application and control, as well as of the identification of new products with GI potential. In this perspective, central governments should propose sensitization and capacity building to the staff in local and regional authorities.

Another important element that public authorities should take into account is the support policies and information campaign they should integrate in order to enhance the success of the GI system in the economic, social and environmental fields.

**Supportive policies**

Governments should consider taking actions along the different steps of implementation and management of a GI system: identification, qualification, remuneration and reproduction of local resources[1] in order to develop the enabling environment that will support sustainable GIs.

The first support is related to the identification of the potential and the characterization of links between the product's quality and its geographical origin: studies and analysis could be supported by universities and research centres to help producers in identifying their potential for a GI through inventories. Whenever the case arises, it is very important to justify the links between quality and geographical origin so as to elaborate the future specifications. At a national level, public actors could identify potential products and stakeholders or

[1] See FAO-sinerGI guide on GIs Linking products people and places, available at http://www.foodquality-origin.org/guide/index.html

interprofessional bodies ready to cooperate in order to implement new GIs. As a follow up, public actors should launch pilot projects to develop newly registered GIs, in particular those products meant for export. The public sector should also provide temporary support such as investment to pilot cases, which could serve as a learning process and provide lessons for future cases.

As for the qualification phase public authorities play an important role in providing the relevant information on the legal and institutional framework and in facilitating the registration once the request and code of practice is finalized. This relates to the description of the product and the elaboration of the code of practice in order to be recognized by society through an official registration and by the market.

For the next phase of remuneration of the GI to its stakeholders, governments and local authorities should help in raising consumer awareness on what a GI is. Other specific quality labels are also necessary to allow the positioning of the product in the market. A major tool is a national official logo that will identify all GI products registered so as to build consumer recognition. Other tools to raise awareness through the media can be used to disseminate information, for example, by publishing booklets with short straightforward messages, organizing fairs and festivals, or publishing videos and flyers. Public institutions can play another important role in supporting the setting up of an interprofessional organization of producers and other GI stakeholders at the local level. This organization should represent all potential stakeholders in the GI system equitably. It should also allow the redistribution of added-value by ensuring that farmers and primary producers have a majority say in the association while building the capacity of producers in managing the internal control system. Another way of supporting territorial development is by enhancing linkages with activities from the tourism sector, for example by including GIs in a national strategy for tourism and export promotion of the country's products.

The last phase is the reproduction of local natural and human resources supported by a regular impacts assessment. The impact assesments of the project and its actions relate to economic, social and environmental dimensions, which can lead to the reorientation of the system towards more sustainability. The role of public actors is very important here to call for and facilitate such assessment and support the inclusion of new rules and requirements which can support a GI process in contributing better to the three pillars of sustainable development. Once the way of improving the system has been agreed among producers, public authorities should provide a simpler procedure to allow the registered code of practice to evolve. This should be taken into account in the legislation and the conditions for modifying the code of practice should be clearly defined.

## b. Local level and value chain

For the GI system to benefit producers and territorial development, different actions should be taken into account in the different phases of the implementation and management of the GI system, including its marketing chains.

**Setting up the GI: identification and qualification of the product**

During the first phase of identification, it is very important to identify properly the resources that give the product its specific quality. These specific resources should be included within

the code of practice during the qualification phase. It is also very important to identify the market potential and the future niche markets to target. For this, market analyses and studies may be necessary: e.g. documenting traditional knowledge and stories about the product so as to be able to produce a historical record of the GI. Facilitators or an external network of development and research stakeholders may help the producers in these phases. Nevertheless these facilitators should not carry out all the process but ensure the empowerment of local actors in the implementation of their GI system, and subsequently its management. Indeed, facilitators should involve all value chain actors, in particular the primary producers, so as to ensure representativeness in the setup process.

Local actors have to make sure that the code of practice that defines the criteria for the specific quality of their product is controllable, and establish a control plan. It is possible to consider the code of practice as a tool to ensure food safety requirements by introducing them within the description of the process. The code of practice may also include product innovations as the origin-linked product may have to evolve in time to address the consumers' demand, while maintaining its specific quality.

The long time this process requires should be seen as necessary to ensure learning and empowerment.This is particularly important for bottom-up approaches, which should be privileged. To give producers time to comply with the code of practice, a pilot test scale may be considered before the system is generalized to a whole production area. In this pilot phase facilitators and organizations should provide technical assistance: capacity building, technical inputs, financial support for investment, sharing of knowledge through study tours, privileging areas with ancient experience or neighboring countries to favour a regional approach, and documentation, especially in the case of small-scale producers.

**Managing the marketing and conformity of the GI**

Solid marketing and control systems for GIs should developed to ensure their economic viability as a pillar of sustainability. To achieve this, it is recommended to set up a local organization including farmers, processors and distributors concerned by the GI, if it is not already existing. This interprofessional organization is responsible for the internal control system. It should also be responsible for communication and promotion related to the collective reputation of the product. As for promotion, the organization and participation in local and international fairs is a very relevant way to build and reinforce the product's reputation.

Projects to support the marketing chains should plan activities for both short- and long-term. These activities should enhance the market linkages with sellers, retailers or exporters, according to the local context. In order to undertake this, study tours and the organization of visits within the territory are a good way to present the specific conditions of production and the specific quality, and favour marketing relations and trust between the stakeholders.

Organizations involved in supporting the GI process should provide support to foster agro-industries based on GIs, especially by providing technical assistance on market assessment and increasing the awareness of consumers. Guidelines should be diffused: the FAO-sinerGI guide *Linking products people and places* is available online in French and English.[2] Translation into Asian languages should be facilitated by national governments while training tools based on the guide will be developed and diffused by FAO.

[2] http://www.foodquality-origin.org/guide/index.html