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Range and Limit of Geographical Indication Scheme: The Case of Basmati Rice from Punjab, Pakistan

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Abstract

Basmati is well renowned as the most aromatic rice over the world. Populated urban markets are prone to accept a premium to Basmati, whom price is the highest for rice on trade and domestic markets. Punjab province represents 90% of overall Basmati rice production in Pakistan since immemorial times. This area forms the genuine alluvial lands appropriate for Basmati cultivation. Due to its price premium, some opportunist behaviors appear such as cropping blending of polished long grain from other varieties. The need of protection is clearly documented, but the registration of a Geographical Indication, will probably increase Basmati market shortages.

Keywords: Basmati rice, Marketing, Commodity chain, Geographical Indication, Pakistan

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Introduction

"Basmati is a premium long grain rice. Its high value comes from its characteristic aroma in both the raw and cooked state, and the grain is a distinctive shape, which on cooking elongates to almost double its length whilst its width remains the same. In addition to having unique eating qualities, Basmati rice is reported to be a good source of slow releasing carbohydrates (i.e. it has a low glycaemic index compared with other rice)" Burns et al., 2004.

Basmati rice (*Oryza sativa* race *Indica*) is generally judged by three main factors: appearance, aroma and taste. Basmati rices are characterized by superfine grain, pleasant aroma, soft texture and extreme grain elongation with least breadth-wise swelling on cooking (Singh et al., 2000-a). The Basmati rice has traditionally been grown in the north and north-western part of the Indian sub-continent for centuries. Basmati grows best and produces best quality grains under warm, humid, valley-like conditions (Singh et al., 2000-c).

Basmati rice is a staple food for people from Indian sub-continent and for their ethnic communities in the European Union (EU), especially in United Kingdom (UK). Although mainly eating wheat as cereals, people from Pakistan express strong links related to Basmati rice as a cultural heritage. Basmati rice is increasingly becoming an important food for the EU as a whole. In recent years sales of Basmati rice have increased by around 12% annually; and are expected to overtake sales of other long grain rice shortly. Currently, Basmati rice accounts for around 38% of the dry rice market oriented towards direct food consumption, while the main market for coarse rice varieties is the transformation process used in the food and drink industry, and the pharmaceutical sector as well.

Basmati rice attains a higher price than non-Basmati rice in both wholesale and retail markets. It is the highest price on world export market. This price premium attracts lot of players and increases competition between domestic and trade markets. It may probably also foster fraudulent blending. Known as both the best aromatic rice over the world and rooted basis of cultural identity on Indian sub-continent, Basmati rice appears as a good candidate for Geographical Indication. The present article offers an overview of the Basmati rice commodity chain in Pakistan with successive issues focusing on the economy, the intrinsic attributes and the progress on the way of Geographical Indication scheme. This article uses data issued from broad literature review of recent scientific publications, completed by field study held in April-May 2007 that allowed interviews of several local stakeholders.

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The Economy of Basmati Rice in Pakistan

Economic Value

In spite of low yields compared to other varieties, Basmati is interesting for all the commodity chain actors thanks to its price premium. Basmati is measured as the only crop which gained acreage in Pakistan due to the globalization of commodities market (Ishtiaq et al., 2001). Basmati is known for its low yield 2.8 tons per hectare (T/ha) for Basmati 370, the oldest variety, although it was noticed 3 to 4 T/ha in experimental plots with Pusa or Haryana Basmati (Chaudhary et al., 2003). Basmati is well renowned as one of the most aromatic rice over the world, if not the best one (Weber et al.,2000). The aromatic varieties such as Basmati and Jasmine represent around 10% of world wide traded rice (von Braun and Bos, 2005; Childs, 2001).

In Pakistan, Basmati production represents 2920.4 thousand tons (KT) which means 52.6% of overall rice production in 2005-06 campaign, and 63.3% of rice acreage (MINFAL[1] 2007-a). Basmati represents 22.7% (839.0 KT) of quantity but 41.4% (28714.1 million PKR[2]) of value of overall rice exportations from Pakistan, while rice is 25.1% (value) of agricultural commodities exported and 4.7% of overall Pakistani exports in 2005-06. Exports represent 28.7% of Basmati crop but 108.5% of other varieties production[3].

This situation is peculiar, as it is reported that the international rice trade is estimated between 25 to 27 million tons per year, which corresponds to only 5-6 % of world production (Mendez de Villar, 2006). In 2005, world import of rice is estimated 29.8 million tons which represent 4.7% of 632.9 million tons of the world paddy production (FAO, 2007). At a world level, rice trade is a minor issue compared to self-sufficiency for producer countries (Wailes, 2003 ; Calpe, 2005). Rice is the only one commodity whose export value increased (+59.4%) in last decade for Pakistan (Chand, 2005). Basmati rice from Pakistan is mainly exported in Saudi Arabia and EU. Recently Iran became a player for Basmati importation, this increased prices on market places. Basmati rice is of paramount importance for both Pakistani exports and domestic consumption.

According to FAO, international export free-on-board price of Basmati is the highest one, reaching 516 USD /ton in 2006, which is 65.9% higher than Thai 100% white rice, 31.0% higher than US long grain 2.4% broken, and 108.9% higher than India 25% broken (FAO, 2007). International export free-on-board price of Basmati

[1] Ministry of Food, Agriculture and Livestock of Pakistan
[2] Pakistani rupee, 100 PKR = 1.21 EUR and 1.65 USD on 10 September 2007.
[3] According to MINFAL (2007-a), other varieties of rice than Basmati represent production of 2626.8 K tons and exportation of 2849.7 K tons in 2005-2006, indicating that some stored rice was exported out of Pakistan later than the year of its harvest.

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increased from 68.0% since 2002. Basmati price is the highest on export market, but its increase is not exceptional according to other rice prices (see table 1).

Table 1: Rice export prices according to variety, USD/ton free on board

	Thailand 100% white	US long grain 2.4%*	Thailand 25%*	India 25%*	Pakistan 25%*	US California medium grain	Pakistan Basmati	Thailand Fragrant
2002	197	207	171	140	159	271	366	306
2006	311	394	269	247	230	512	516	470
March 2007	325	424	293	260	264	551	615	537
2007/2002	165%	205%	171%	186%	166%	203%	168%	175%

* % broken grains
Source: FAO

Monthly wholesale prices of Basmati (385 new) (PKR /40 Kg) vary from 865 in Multan to 927 in Rawalpindi in August 2006 and increased of 46.7% since August 1996 (MINFAL, 2007). Compared to another rice variety (Irri-6), Basmati costs +45.4% in Hyderabad, +60.5% in Lahore, +62.7% in Peshawar, +71.7% in Rawalpindi and +73.7% in Multan. Populated urban markets in Pakistan are prone to accept a premium to Basmati price. In April 2007, Basmati price ranges from 51 to 58 USD per 100 Kg on the wholesale market of Karachi, while other varieties rang from 23 to 36 USD per 100 Kg. Limited availability of good quality rice in Pakistan results in strong price increases (FAO, 2007).

On the final European market, consumer net prices of Basmati rang from 1.33 EUR /Kg (Distributor brand) to 4.63 EUR /Kg (Strong brand, pre-cooked, microwaveable), to 5.37 EUR /Kg (Fair Trade labeled), while common rice is sold around 1.54 EUR /Kg (data collected in April 2007).

Sustainability and Agronomic Value

According to Khush and de la Cruz (in Chaudhary et al., 2003), *"all the Basmati varieties are tall (150-160cm), very weak-stemmed and have light green and droopy leaves. They invariably lodge at maturity and are thus difficult to harvest. Because of their weak stems and taller growth habit, they are not responsive to inputs. Thus their yields cannot be increased by fertilizer applications beyond 30-40 kg /ha. Under higher fertility level, lodging may occur during the grain-filling period resulting in poorer yields".*

It was found that the agronomic response of Basmati rice growers in Punjab to the green revolution during the 1970s was to increase the use of fertilizers (Farooq et al., 2001 ; Mubarik, 1989). As the increased yields was directly correlated to the increase of fertilizer-use, the benefits for Basmati growers are questionable, due to the high price of fertilizers.

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The Basmati varieties do not offer high agronomic value compared to Irri or other hybrid varieties. According to von Braun and Bos (2005), the yields of long grain rice range from 2.2 T/ha in Thailand (rainfed fields) to 7.0 T/ha in USA (irrigated fields), while for Basmati varieties, the yields range from 2.5 T/ha for Taraori to 4.0 T/ha for Haryana (Singh et al., 2000-a), and is reported to vary around 2.0 T/ha +/- 0.2 in Pakistani Punjab (Moazzam, 2004).

Pakistan has cultivated for a while Basmati, and other rices as well, under the irrigated ecosystem, due to the limited rainfall (von Braun and Bos, 2005). According to MINFAL (2007-b), rice crop used 2621 thousand hectares acreage where Basmati represents 63.3% in Pakistan in 2005-06.

The irrigation system was achieved in early 1900s in the Indus basin (Janjua, 2006). But the water-use efficiency of irrigated rice is low. Von Braun and Bos (2005) estimate that rice growing requires about twice as much water as other crops such as maize and wheat. This is why the water management for rice-wheat system is welcome, in order to reduce water-use by sowing rice on bed instead of flat, while tubewells are still considered as expensive for small farmers (Niaz Rai, 2006; Mobin ud Din et al., 2007). More generally, environmental impact of rice cultivation and processing is a new raising issue for Basmati rice cultivation (Morrissey et al., 2005).

Crop rotation is well installed in Punjab with wheat during Rabi (wet season, winter from November to April) and rice during Kharif (dry season, summer from May to October). Basmati rice is sown in June, and transplanted by hand in irrigated or water-flooded fields in July under 45-47°C temperature. Traditional Basmati varieties are tall growing (up to 170 cm) and highly photosensitive (Singh, 2000). The harvest occurs usually in November, five months after sowing and 35 days after 50% flowering with average moisture content of 21%. As no-tillage technique is now introduced, some farmers adopt direct sowing. Although there is no experimental evidence, farmers say that there is better aroma in direct sown rice crop than in transplanted ones (Singh et al., 2000-a).

In spite of high labor intensive pressure, the risk of switching from Basmati to other rice varieties with higher yield is considered as very low due to the high competitive advantage offered by Basmati price premium at farm gate and all along the commodity chain (Riaz-Mann, 2002). In such a way, Basmati fits well with small farms (less than 2 ha) which make up the farm population in North Punjab (Mubarik, 2005 ; Safdar Baloch, 2004), while the rice farms in Sindh and Baluchistan provinces are larger and cultivate only other rice varieties; those of North West Frontier Province (NWFP) are smaller than Punjabi ones and located in mountain area.

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It was reported that western Punjab (Pakistan) is closer to sustainable rice growing than eastern Punjab (India), both in terms of cropping pattern diversity (diversification index: 0.72 vs 0.60), use of pesticides, fungicides, weedicides and fertilizers (Kg /ha: 183 vs 338), and other low inputs indicators (tractors /thousand ha: 19 vs 96), while the increase of yields is 3.73% vs 0.34 % /year from 1990s to 2000s, although at a still huge difference (ton /ha: 1.53 vs 3.47) (Sidhu and Bhullar, 2005). Behind the discussion on the trade-off between sustainability and post green revolution agriculture, it was found that Pakistan Punjab is still far-off from intensification (Murgai et al., 2001). Thus, Basmati rice growing in Pakistan Punjab may be considered as naturally leading to a quite extensive agriculture. Yield is reported 1721 Kg /ha in 2005-06 in Punjab for Basmati crop (MINFAL, 2007-b).

The first trials of transgenic Basmati variety were reported by Khurram et al. (2004) and show significant differences in the different aspects: agronomy, insects resistance and cooking properties. However, farmers are likely to be reluctant to start genetically modified (GM) Basmati rice cultivation, due to previous experience on the cost of patented seeds.

Local stakeholders, including the Government and the farmers' associations unanimously declare their opposition to GM Basmati cultivation. Nonetheless, an up-to-date overview indicates that several GM lines of Basmati rice have been successfully developed with resistance to different biotic and abiotic factors such as pest, fungi, bacterial blight, drought, cold, salinity (Bashir et al., 2007). GM Basmati is likely to be ready, but not yet released on the market due to the strong reluctance against GM food expressed by consumers, especially in Europe.

Basmati Rice, a Consumer-Oriented Food Product

Consumption

The major rice users at the world level are the food and drink industries (e.g. pasta and bread factories, beer and other liquor distilleries), as well as the pharmaceutical industry (Mendez de Villar, 2006), they use coarse rices. This is not the case in Pakistan, where Basmati rice is reported to be a major production, obviously devoted to direct food consumption by final consumers from domestic or overseas markets, like other aromatic rices.

Wheat represents 89% of cereal direct monthly intake per capita (9.23 Kg) in Pakistan in 2004-05 and rice 11%. However, rice is a staple food in Pakistan. Rice consumption per month in rural areas is 1.08 Kg /capita, 0.93 Kg /capita in urban areas. Pakistan is self-sufficient in rice production with availability of 15.72 Kg /capita /year in 2005-06 (MINFAL, 2007-a). There is no procurement of rice by Government in Pakistan since 1995 (MINFAL, 2007-a).

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FAO estimation is 2148 KT for domestic use of all rice varieties in Pakistan in 2005 (FAO, 2007). The overall production of Basmati is 2920.4 KT in 2005-06, according to the estimation of seed and wastage (6% = 175.2 KT) and exports (839.0 KT), the final availability of Basmati is around 1906.2 KT for domestic market (MINFAL, 2007-a). Including 156.77 million inhabitants, it means around 12.16 Kg per capita /year. Basmati is likely to represent 88.7% of Pakistani rice consumption. Due to the increasing world demand for Basmati, some competition occurs now between trade and domestic markets (Qayyum Mohsin et al., 2006).

Both demanding for Basmati rice, domestic and export markets are segmented by mean of use of different rates of broken grains, which is the present way for quality grading. Export market only accepts top quality (0 to 5% broken kernels), while domestic one is more likely to be open to high-medium quality (5-15% broken). In Pakistan, Basmati rice deals with festive occasions of eating: ceremony, reception of friends or relatives, dinner for birthday, wedding, funeral. Basmati rice may be considered as a conspicuous food used when offering best quality is a signal of both social status and high consideration of guests.

In Europe, Basmati is the only segment showing increased sales on a rice saturated market. As the pre-cooked ready to eat and seasoned packages of rice are increasingly sold nowadays in Europe, it is questionable if the European consumers will be always able to identify or remind the genuine and distinctive aroma of Basmati. It may be confusing for both the consumers and Basmati itself to keep the trend for ready-to-eat coming so familiar that the original aroma of rice would be covered by seasoning.

Up to now, none consumer survey was identified indicating whether Basmati is sought for its aroma and cooking qualities or for its presumed origin from west Asia. Two markets are co-existing, according to previous publications (Chaudhary, 2003 ; Bhattacharjee et al., 2002):

- The domestic market where the salient attributes for Basmati recognition are aroma, even for dry rice in bag, and shape as an additional proof. These experiential and intrinsic attributes involve consumers' knowledge and familiarity to be used.

- The export market, mainly located in Saudi Arabia and Europe, where the salient attributes for Basmati recognition are the word Basmati, the brand name as a guarantee and shape in a minor extent. These attributes are extrinsic and market-driven, they do not need consumers' knowledge and familiarity to be used. In Muslim countries, such as Saudi Arabia, Kuwait or Iran, Pakistani exporters are likely to use specific distribution channels which involve trade relationships based on trust in neighborhood.

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Organoleptic, Cooking and Nutritional Values

Basmati rice has very interesting cooking qualities. It is a non-waxy, non-glutinous rice and does not stick on cooking. It cooks flaky and remains soft on cooling and has a high volume expansion. Its elongation after cooking is also measured as the longest one, while its width remains the same (Bhattacharjee et al., 2002).

It is reported for a while that Basmati emits specific aroma in the field at harvesting, in storage, during milling, cooking and eating (Jefferson, 1985). Several listed publications pointed out the peculiar aroma of Basmati, which is claimed to be one of the most specific characteristics of this rice. Surprisingly, only two of them indicated documented sources on the characterization of Basmati aroma. Basmati rice was analysed by using gas chromatography in order to identify the spectrum of its volatile components. It was found that about 100 volatile compounds are responsible for Basmati flavour (Bhattacharjee et al., 2002). Previous works identified 29 volatile flavour components in Basmati (Weber et al., 2000). The profile of concentration of major volatile compounds is quite different for Basmati compared to other aromatic rices (Weber et al., 2000). It was also interestingly reported that *"when grown outside the Punjab region in Pakistan, Basmati is not aromatic"* and not so much elongated after cooking (Bhattacharjee et al., 2002).

Antioxidant properties were assessed in Basmati from Pakistan (Iqbal, 2005). Basmati compares well with common rice varieties with respect to protein content, ash content and crude fibre (Bhattacharjee et al., 2002). The fatty acid composition of the triglycerides of Basmati lipids has been reported to be slightly higher than for common rice varieties, the same does not occur for amino-acid profile whom no significant difference has been reported yet (Bhattacharjee et al., 2002).

Food Safety and Certification

Mandatory for export, the certification procedure for Basmati rice comes from two major issues: authentication and food safety.

The authentication of Basmati rice is an important topic since its price is the highest on trade market. The privatization of rice trade started in 1988 in Pakistan and was achieved in 2001. This opened rice trade to several players, sensitive to the market pressure increasingly demanding Basmati rice, while the production does not always follow this trend. Nowadays, DNA tests are mandatory for export in Europe.

A survey was carried out in 2002-03 by the British Food Standards Agency in order to measure the sincerity of labeling Basmati on rice packages sold in UK (Burns et al., 2004). The survey employed a novel DNA test which was developed by the Agency. Approximately one-third of the 363 samples, collected from a range of retail

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outlets and catering suppliers, were labeled as from India, one-third from Pakistan, and the final third were not labeled with the country of origin. A small number of samples were labeled as mixed origin.

Although not required by law, 68 samples displayed a Basmati varietal name (Super and/or Kernal) on their packaging. Analysis found that only 19 of these samples were comprised wholly or mainly of the variety claimed. In the remaining 49, the declared variety was either a minor component of the mixture, or was not present. 18 samples were labeled as 'Super Kernal', which is not an approved varietal name, and could be confusing to consumers as it mentions two individual varieties "Super" and "Kernal".

All samples claimed to be Basmati rice as written on their labeling. While 196 (54%) samples were found to contain only Basmati rice, non-Basmati rice was detected in 167 (46%) of the samples analyzed (Burns et al., 2004). In around 24% of these samples, the non-Basmati rice content was relatively small i.e. less than 10% (and below the limit of measurement in 10% of these samples). However 63 (17%) samples had a non-Basmati rice content greater than 20%. Of most concern were the 31 (9%) samples that were found to have a non-Basmati rice content greater than 60% (Burns et al., 2004).

These very interesting results, obtained in the main European importing country for Basmati rice, highlight the advantage of a robust method available to check variety and non-Basmati rice addition. They also give suitable orientation for the revision of the export standards for India and Pakistan, and for the updating of EU importers Code of Practice as well. Clean and fair practices should be promoted within the rice commodity chain in order not to mislead consumers.

In view of the higher price of Basmati, the EC Rice Regime grants a restricted list of certain Basmati rice varieties a refund of 250 EUR /T on presentation of certificates of authenticity. Hence in the interest of preventing fraud, only those varieties which are eligible should receive the refund. The Regime has recently been amended to limit the receipt of refund to a more restricted list of varieties, which comes into force after March 2004 (Burns et al., 2004).

However the authentication of Basmati variety does not indicate clear origin or provenance. On the domestic market, the aroma is reported as the major cue used to testify Basmati. However, there is no scientific publication on the way used by stakeholders for this purpose. It is questionable to measure how strong is the capability to authenticate Basmati by means of olfaction by local consumers and stakeholders. In other words: Which rate of blending are human testers able to discriminate?

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DNA test, as shown above, is able to testify the given sampling is coming from a certain variety, here Basmati. DNA is a technique used for variety authentication. Notwithstanding, DNA cannot certify the area where the variety was grown. Thus DNA test should not be considered as a substitute of certificate of origin or provenance. In such a way, efficient traceability may cope with both origin certification and food safety control.

Few sanitary dangers are associated to rice, aflatoxin is one well known since many years. Some peculiar conditions, ie humidity and high temperature, during last maturation of rice favour the development of certain fungi such as Aspergillus, then production of aflatoxin is possible. When lodging at maturity, Basmati rice may be infested by aflatoxin due to its stay on soil.

Shipping aflatoxin-free rice is mandatory for importation in EU as aflatoxins lead to the production of acute liver carcinogens in the human body (Otsuki et al., 2001). The EU aflatoxin standards are around two times more stringent than those admitted by Codex Alimentarius. The import certification process is very strict and limits the provenance of Basmati rice coming in Europe from millers which are able to guarantee this aflatoxin zero level, such Guard Rice Ltd, a private company based in Lahore.

The laudable intention to guarantee food safety is not questionable, notwithstanding leading to higher entry barriers in Europe for Basmati from Pakistan. Rice exports from Pakistan drop frequently due to quality problems, caused by heavy rainfall at harvest time and lack of proper storage (FAO, 2007). Thus the Government of Pakistan, now conscious of the importance of rice as a trade earner, is launching an awareness campaign to raise the quality of the grain produced, including the most remunerative market of Basmati rice.

The importers are encouraged to have vigilant inspection criteria to collect aflatoxin-free rice from Punjab. It is also possible that some would be prone to collect rice in areas where it may probably be more aflatoxin-free, these areas are probably not located in Punjab. Thus, harvest is less prone to be subject to aflatoxin infestation. This move of rice crop for export in areas where the combination of water and temperature is different from Punjab, is a paradoxical effect of food safety control against aflatoxin.

Aflatoxins are deemed to be mainly located in dust and chips extracted from grain by polishing cargo rice. De-husking, polishing and drying processes reduce the rate of aflatoxin (Vasanthi and Bhat, 1990). As the import duty is zero for husked Basmati rice, but not for milled one (Muhammed and Pirzada, 2005), trade tariffs on rice in EU do not seem to be driven by food safety, and are likely to actually protect added value of European millers, which are mainly based in UK.

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Nonetheless, the narrowing of the duty differential between husked and milled rice will reduce the protecting effect on the EU milling industry (FAO, 2007). The positive effect of this trade policy looks like a way of selection and improvement of exporters. Those from Punjab who are still able to export in Europe, comply with high standards of quality control. This capability is likely to come from their higher level of education (managers and staffs) (Moazzam, 2004). These private stakeholders show proof it is possible to control aflatoxin infection in Basmati rice harvested in Punjab and to comply with sanitary and phytosanitary mandatory conditions for exportation in Europe.

The longer commodity chain which occurs from this trade regulation may confuse consumers by offering them an aflatoxin-free rice, called Basmati but not coming from the region of origin. Rice milling industry gathers only 228 millers in Pakistan which account for 2.3% of value of agro-based production (MINFAL, 2007-a). The location in Punjab of added value created through Basmati commodity chain seems perfectible.

The threat of making Basmati rice a generic resource is not so far. Nonetheless Basmati seeds sown out of Punjab don't give rice with the same quality characteristics. This rice should not be labeled as Basmati rice due to its non provenance from the region of origin.

Basmati rice and Geographical Indication

Region of Origin

The Pakistani Punjab consists with the region so-called the Indus basin in the foothills of Himalaya range. The Basmati growing area is in North Punjab, while South Punjab acreage is devoted to cotton fields, and Sindh province welcomes other rice varieties growing. Balochistan province is almost salted desert, although some districts located in Indus basin intend to develop agriculture and rice production (Safdar Baloch, 2004); NWFP and Gilgit regions are quite mountainous areas, still some districts are minor rice crop areas. Punjab province welcomes 55.6% of overall population of Pakistan (Census 1998) and 60.5% of agriculture share in 2005-06 (MINFAL, 2007-a).

Punjab represents 90.5% of overall Basmati rice production in Pakistan in 2005-06 (2920.4 KT), Balochistan 8.6% and NWFP 0.9% (MINFAL, 2007). In Punjab, Basmati represents 83.0% of all rice crop in 2005-06. In almost all districts, Basmati or Irri varieties are exclusive for rice crop. Among the most important Basmati producing districts (more than 50 KT), 16 up to 17 are located in Punjab province.

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In old Urdu language, Punjab means *punj* (five) *aab* (water). It is located between the five rivers coming from Himalaya range: *Indus, Jhelum, Chenab, Ravi* and *Sutlej* (from north-west to south-east). This area forms the genuine alluvial lands appropriate for Basmati rice cultivation, due to good water availability, but not marshland, high temperature and important sun exposure, at a low altitude.

It is also worth mentioning that growing the Basmati plant is possible anywhere, but the specific characteristics are linked to production of rice in the specific districts of Punjab. The rice produced from the same seed but in different environments of area does produce rice but not Basmati.

In spite of its name, the Indian region Haryana was included in ancient Punjab, before the partition done in 1947 by the Authorities of the British Empire for the independence of India and Pakistan. Thus, old Punjab is likely to include present Pakistani Punjab, Indian one, and Haryana. All these areas formed the old Punjab before partition and are reported to be the Basmati belt, including the plain below Dehra Dun in Uttarakhand (former Uttaranchal, created in 2000, India).

The homogeneity of these districts of the Himalayan foothills is questionable as the paedo-climatic conditions, altitude and landscape as well, are very different and impact on Basmati characteristics. However, these districts belonged to Punjab in ancient times. The present relative share for Basmati is 87% of total rice acreage in Pakistani Punjab (MINFAL, 2007), 30% in Haryana, 3% in Uttaranchal[4] and 5% in Indian Punjab (Bhattacharjee et al., 2002).

Historical Origin and Symbolic Value

The word Basmati has been derived from two Sanskrit roots: *vas* (aroma) and *mayup* (deep-rooted). While combining, *mayup* changes to *mati* making *vasmati,* pronounced as Basmati (Singh, 2000). The etymology of Basmati is linked to the generous aroma of this original rice. The historical origin of Basmati rice is known to be written in Urdu in *The Adventures of Hir and Ranjha* (Shah, 1767), which was translated into English around 1910 by Usborne. The purpose is a tale of love in Punjab. The second paragraph of chapter 16 describes several foods displayed for a wedding: *"… all kinds of varieties of rice, even Mushki and Basmutti*[5] *and Musagir and Begami and Sonputti"*. The Urdu version was dated from 1767 according to Orsini (2006). Thus the first written proof of location of Basmati rice in Punjab is old[6]. This document is used for the justification of intellectual property rights (IPR) on Basmati rice by MINFAL. It is also interesting to highlight that Basmati rice

[4] quoted as Uttar Pradesh in Bhattacharjee *et al*., 2002.
[5] The historical name varies: *Bansmatti*, *Bansmutty*, *Bansmati*, *Bansmuttee*, *Bansmatee* in Punjab, and *Basmoti* in Bangladesh (Singh, 2000).
[6] Compared to what is usually documented in Europe for Geographical Indications, 1767 is a very old date.

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consumption is genuinely linked to festive occasions, which is nowadays one of the common features of GIs all over the world.

More recently, the first indication of a release of a pure line selection was done by the Rice Experimental Farm in Kala Shah Kaku (Punjab, Pakistan) in 1933 as Basmati 370 (Chaudhary et al., 2003). The majority of pure line selections were carried-out in the same Institute since this time. Nowadays, several lines of Basmati are developed for yield improvement. The growing area is spread out of Punjab since decades, due to price attractiveness, in spite off low yields and labor intensive cultivation. Basmati-based hybrid rices are now sown in Pakistan, India, Bangladesh, Sri Lanka and United States of America. They are encouraged to be under trial for adaptation and selection in several Asian countries with support of IRRI[7] (Singh et al., 2000-a). Albeit coming from cross-breeding of Basmati pure lines, these Basmati look-alike rices do not offer similar aroma qualities than Basmati from Punjab (Bashir et al., 2007). However, far-off consumers, particularly in Europe, are likely to pay more attention to the name of rice, instead of aroma characteristics which also depend of the cooking skills of final consumers.

Finally this means that selling Basmati rice in present market doesn't allow to guarantee the genuine quality linked to *terroir* of Punjab. These elements may explain why Pakistani stakeholders are likely to be very sensitive to the origin of Basmati rice, although not often acting as first players on Basmati worldwide market.

Intellectual Property Protection in Pakistan

IPR in Pakistan is an old story since Patent Act (1911), Trade Marks Act (1940), or Copyright Ordinance (1962). The new Intellectual Property Laws were published in 2000, including Registered Design Ordinance, Layout and Design Ordinance and Patent Act. The major change is the creation of a unique and powerful office for intellectual property protection (Urbany and Allah, 2006). Intellectual Property Organisation of Pakistan (IPO) was created in April 2005, it is under the direct authority of Prime Minister[8].

Up to now, the legal framework for IPR is based on *trademarks* protection regime in Pakistan, with special focus on *well-known marks, certified marks* and *collective marks.* Pakistan is on the way of achieving the translation of TRIPS in domestic Law. However, this process is not finished yet, as some aspects of TRIPS such as biodiversity and genetic property are still discussed.

[7] International Rice Research Institute.
[8] It means IPO is not depending on Ministry of Trade nor Ministry of Agriculture nor Ministry of Industry, in order to avoid any conflict of interest.

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The regulation for geographical indication (GI) protection, which is still in circulation within the different stakeholders, is based on *"Geographical Indication of Basmati as a collective mark "Basmati", according to section 82 of the trade marks ordinance, 2001".* The Trade Marks Ordinance was promulgated in 2001 and came into force in 2004 (Quasim Shah, 2004). Recently, the application of registration of GI Basmati was filed in December 2005, under section 82 of this Ordinance. However, this registration is not yet granted, due to some opposition coming mainly from traders.

Claiming for GI label should lead to better identify and locate the relevant supply chain and the stakeholders as well. The most salient trait of GI products is the management of added value between farmers and local processors, before the long or short supply chain, which makes a huge difference with usual, although local, agricultural commodities. Claiming for GI label should also active the selection of who complies with code of practices and high quality standards and who doesn't. This process of quality management has a cost that should not be ignored by GI candidates.

Presently, the different recognized lines of Basmati in Pakistan are: Basmati 370, Basmati 385, Super Basmati, Basmati 198, Pak (Kernel), Basmati 2000 and Shaheen Basmati, according to the project of regulation. All the above-mentioned varieties are registered under Seed Act 1976 by Federal Seed Certification and Registration of MINFAL. However, it is questionable when the list of native and indigenous lines of Basmati will be closed according to the project of GI. Basmati 370 was identified in 1933, but Super Basmati was developed in 1995 (Bashir et al., 2007). Although derived from traditional cross-breeding from Basmati 370 and IR661, this line is recent and its inclusion as a candidate for the GI package may keep the list open for registration of any recent developed line of Basmati variety like Basmati 2000 or Rachna Basmati, not always showing strong links to Punjab. In such a case, Basmati from Texas or Basmati from Nepal may find a kind of justification.

More generally, the long list of Basmati lines may confuse non skilled stakeholders and consumers as well. At least 60 lines of Basmati rice are released on the world seed market. The list includes the name of the major pure lines and various hybrid as well (see Table 2).

Of the largest aromatic germplasm maintained at IRRI, about 86 are described by the name Basmati irrespective of grain dimensions and intensity of aroma: Pakistan (67), India (9), Nepal (7), Bangladesh (2) and Sri Lanka (1). Comparing these with Basmati standards, only 18 qualify as Basmati (Singh, 2000). A harmonious combination of minimum kernel dimension, intensity of aroma, texture of cooked rice, high volume expansion during cooking made up by linear kernel elongation with minimum breadthwise swelling, fluffiness, palatability, easy

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digestibility and longer shelf life qualify a rice to be Basmati in consumers' and traders' view (Singh, 2000).

Table 2: Released Lines of Basmati Rice

Major lines (also known as XX)	Other varieties (list not complete)		
Basmati 370	Baldhar B.	B. 6141	Kasturi
*Dehraduni B.**	B. 106	B. 6187	Local B.
Type 3	B. 107	B. 6311	New Sabarmati
Punjab B.	B. 123	B. 6813	Pakistani B.
B. 386	B. 134	B. 93	Punjab B. 1
Taraori B.	B. 136	B. D	Rachna B.
Karnal local	B. 208	B. Sufaid 100	Ranbir B.
Amritsari	B. 217	B. Sufaid 106	Sabarmati
HBC 19	B. 2000	B. tall	Seond B.
Haryana B.	B. 3708	Basmoti	Shaheen B.
Pusa B.	B. 388	Champaran B.	Tapovan B.
B. 198	B. 5833	Chimbal B.	
B. 385	B. 5836	Early B.	
Super B.	B. 5875	Guarav	
B. Pak	B. 5877	Hansraj	
Kernel B.	B. 5888	Kashmir B.	

* B = Basmati
Source: (Singth et al., 2000-b; Bashir et al., 2007)

As Basmati price premium is the highest on trade market, some opportunist behaviors appear such as:

- cropping Basmati variety out of Punjab, creating a claim for identification of region of origin (Chandola, 2006 ; Chatuverdi, 2002)
- blending of polished long grain from other varieties (Burns, 2004), pushing importers into a clearer code of practice (British Retail Consortium, 2005)
- collusion between brokers leading to higher price (Banerji and Meenakshi, 2001), calling for market regulation by Government
- attempt to patent Basmati by private company leading to protection scheme of common living resource (Sarfraz, 2001 ; Nair and Kumar, 2005).

The Attempt of Private Patenting

Basmati rice issue proved in 1997 to be a watershed development for Pakistan when an American Texas-based company RiceTec Inc. was granted an international patent on Basmati. Once the patent was granted, RiceTec did not only label its rice

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Basmati within the US, but also exported it as Basmati all over the world. This company, developed an American-grown aromatic rice and obtained a patent in 1997, for new lines of Basmati rice, from the United States Patent and Trademark Office (USPTO), marketed under the trademarks *Texmati* and *Kasmati.*

The company claimed to have produced a superior variety of Basmati, with semi-dwarf long-grain traits of photoperiod insensitivity, high yielding, disease tolerant and a dwarf plant, by cross-breeding Pakistani Basmati varieties with American long-grain rice varieties. The patent was titled "Basmati rice lines and grains". It was claimed that the plants thus bred were of semi-dwarf variety, substantially photo-insensitive and high-yielding. The patent had 20 claims.

The patent details the history of Basmati grown traditionally in India and Pakistan and the difficulty of growing such varieties in other areas, in order to justify the breeding of traditional Basmati varieties and semi-dwarf varieties locally adapted. Seen from India and Pakistan, the issue resides in qualifying theses varieties as Basmati, generating the confusion with the varieties grown in these countries. The claim had given RiceTec monopoly to sell, market and import into the US rice grains having the claimed features, irrespective of the place where they had been grown. This claim, without any territorial limitation, contents a serious risk of infringement against importation and sale of Basmati rice, from India and Pakistan, in the US.

The Indian and Pakistani Governments filed a petition against the patent in 2000, challenging the claims having none limitation of territory. The USPTO examiner issued a long notice to RiceTec in 2001 asking the company to justify the issuance of the patent without any territorial basis (Nair and Kumar, 2005). RiceTec replied by surrendering all the broad-based claims relating to the plant, method and the seeds. It was left with a truncated patent with five minor claims.

RiceTec also applied to register the trademark *Texmati* in UK in 1999 for its rice. The word *Texmati* is a compression of Texas and Basmati. In 2000, opposition against the application raised on the ground of deceptiveness due to its similarity with the word Basmati and its use for rice grown in the US. RiceTec objected that Basmati did not mean any GI for rice grown in the Indian sub-continent but any rice which is aromatic and can be grown anywhere in the world. The opponents shown many evidences, from UK stakeholders and rice end-users, to demonstrate that Basmati was understood in the UK as referring to long grain aromatic rice grown in the Indian sub-continent. The company decided to withdraw the trademark application (Nair and Kumar, 2005).

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RiceTec applied again to register the trademark *Kasmati* for its rice. It was US grown rice sold in package with a labeling including a caricature of the Taj Mahal[9] and the expression "Indian style Basmati Rice". The word *Kasmati* is a compression of Karnal and Basmati. The opponents immediately sought the cancellation of the trademark as it used Indians symbols on labeling and none of the specific traits of Basmati rice was assessed in the product. Finally the company opted not to contest and completely surrounded the trademark registration.

The RiceTec dispute convinced the Government of Pakistan, and India as well, and many stakeholders of the rice commodity chain about the need to protect Basmati through GIs system. Thus these actors may have will to agree the extension of article 23 of TRIPS into products under article 22 regulation (Chatuverdi, 2002 ; WTO, 2003).

The RiceTec patenting attempt has provoked lot of well documented publications (Chandola, 2006; Lightbourne, 2003; Mulik, 2004; Nair and Kumar, 2005; Rangnekar, 2005; Sarfraz, 2001; Sattar, 2005). Nowadays, the international patent of RiceTec Corp. for Basmati is broken, but the national one is still valuable for the US market. This trial of private patenting natural living resource, cultivated by small farmers from time immemorial, stimulated the process of GIs protection in Pakistan.

Discussion

It was found during this overview that, due to the specific organoleptic qualities of Basmati rice, populated urban domestic and overseas markets are prone to accept a premium to its price. Basmati rice deals with festive occasions of eating. Thus it is of paramount importance for both Pakistani exports and domestic consumption. Punjab province represents 90.5% of overall Basmati rice production in Pakistan and is documented as its *terroir* of origin.

However, the growing area is spread out of Punjab since decades, due to price attractiveness. This rice, sawn out of Punjab from Basmati seeds, doesn't offer similar qualities, especially aroma, than Basmati from Punjab. However, it may be less sensitive to aflatoxins than the genuine variety harvested in the region of origin. Millers and exporters, closer to the final markets, are responsive to the demand of rice called Basmati, not necessarily grown in its region of origin.

The Pakistani regulation for GI considers Basmati as a collective mark. A mark, even collective, can be produced everywhere, so the IPR of Basmati rice are not strictly located in the region of origin. Thus, the *Basmati* commodity chain seems to

[9] The Indian monument most visited by foreign tourists, but not located in Punjab. Out of India and Pakistan, it is a salient image, typical of Indian sub-continent, although coming from Muslim culture and not Hindu one.

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be under corporate governance with high competition pressure, used by traders and some millers to slower the process of GI protection against the growers' wishes[10].

As two different markets co-exist for Basmati rice, the question of GI appropriateness raises. The domestic market uses aroma as a means for authentication of Basmati. Thus the supply for domestic market comes from Punjab. Domestic market does not need any GI and is price sensitive. The export market is more prone to look for Basmati name *per se* than for its intrinsic qualities and is paying more attention to food safety control. The supply of this export market partly comes from Punjab and also from other cropping areas offering a less aromatic and more toxin-free rice than Basmati from Punjab. The export market is less price sensitive but needs authentication of Basmati rice and possibly an indication of provenance from Indian sub-continent.

Actual Basmati market is apparently efficient, although often facing to shortages. The split is leading to rather satisfactory regulation for both domestic and export markets. They both accommodate with shortages by high price and conspicuous consumption. However, the very high level of Basmati price is attractive for stakeholders of this specific commodity chain. Some players seem to adopt opportunist behaviors. Cropping Basmati variety out of Punjab is usual, blending polished long grain from other varieties with Basmati is also proved, collusion between brokers leading to higher price is noticed and attempt to patent Basmati by private company occurred recently. These different actions provoke a claim for identification of region of origin, push importers into a clearer code of practice, and create a need for market regulation by Government, leading to protection scheme of common living resource.

Thus, the threat of making Basmati rice a generic resource or a private one is real. The arrival of a new player will destabilize the Basmati commodity chain for sure, as it was shown during the RiceTec attempt of private patenting Basmati rice. Nonetheless, the registration of a Geographical Indication, will probably increase Basmati market shortages due to strict delimitation of growing area. It is questionable whether the Punjabi farmers' interests, and those of rice growers in the Indian sub-continent, should have to be unsettled by the stated interest of European consumers for a GI *Basmati from Punjab*.

The will of Punjabi farmers and Basmati stakeholders to work together and better organize their commodity chain should be better taken into account, once clearer expressed. Up to now only the Government's voice seem to be audible, despite that the privatization of rice trade was achieved in 2001. However, the need of protection is clearly documented for Basmati rice. The question is: What is the most

[10] via Basmati Growers Association vs Rice Exporters Association in Pakistan, such conflict of interest is likely to be extended in Ministry of Agriculture vs Ministry of Commerce.

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convenient way, Geographical Indication or Seed Patent according to Intellectual Property Rights?

A seed patent will protect Basmati lines and will allow Basmati to be grown in enlarged area, for sure. It may lead Punjabi rice growers to disappear or to switch to other crop, as the local yields are low and toxins risk, even minor, is still present. This will also bring higher production available on market with expected prices dropping. The DNA variety control will be a key issue, as new varieties will be introduced and probably some GM ones.

A Geographical Indication will not mislead export market but will enhance price pressure on domestic market. Basmati rice production will be limited to the harvest originating from Punjab. Present crop areas out of Punjab will probably move to other long grain varieties, still valuable rice production. The need of variety control will be very high as the inflated prices will be very attractive. The yields improvement will be a key issue, encouraging the development of new lines which may not fully comply with GI regulation. Market release of GM Basmati might be tried despite the present unanimous declared rejection.

In Europe, the EU regulation 510/2006 allows GI registration for product originating from third countries (European Community, 2006). The first extra European application of GI regulation is coffee from Columbia. In the case of rice, cropping under GI is not significant in EU. Only very small productions are under PDO[11] label in Valencia (Spain) and Vercelli (Italy). More noticeable, albeit still small production, is the PGI scheme used for rice from Verona (Italy), Tarragona (Spain) and Camargue (France). The PDO scheme is very strict with a clear and certified location of both production, processing and packaging in the area of origin. This is why the PGI scheme fits better with Basmati crop from a specific area of origin and allows exportation of paddy for de-husking in foreign millers for rice still complying with GI regulation. It is worth noting that, while PDO-PGI scheme allows good price premium for labeled products, European PDO and PGI labeled rices are sold at a lower price than Basmati on the Community market.

A costs/benefits analysis applied to possible GI Basmati pinpoints the following foreseen issues:

- In case of no GI application, the Basmati market could be soon under brand regulation promoted by strong trade companies. This will allow to increase production on the basis of enlarging cropping area far from the region of origin. The price at farm gate will drop but not necessarily the in-store price due to persistence of high demand. Aroma will not stay longer a salient attribute of Basmati as the rice will come from miscellaneous regions,

[11] PDO = Protected Designation of Origin, whereas PGI = Protected Geographical Indication.

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including Bangladesh, Nepal, Texas and even Italy[12], where Basmati seeds do not provide the full Basmati qualities. Hence the most salient attributes will be the long shape of grain and the name Basmati per se. Based on the appearance, Basmati identification may be a bit confusing for end consumers.

- In case of application for GI Basmati from Punjab in Pakistan, the Basmati market could be more under farmers' influence. Market shortages may be more frequent as the certified origin will not allow to enlarge cropping area. The issue of increasing yields through new lines release will be pending as the introduction of GM would not be expected in case of GI label oriented to European market. Aroma will stay a salient attribute of Basmati and all prices (farm gate, store, domestic, export) will increase for sure, allowing a better share of the premium along the commodity chain. End consumers will not be confused thanks to GI label. However, the application of GI Basmati from Punjab in Pakistan will provoke reactions from neighbors. Attracted by high price, GI applications for Basmati may come from other cropping areas, including other countries, as seen above. Thus, Basmati market segmentation will occur, depending on the aroma sensitivity, as this attribute seems to be the only one varying according to the cropping area, with strong advantage to Basmati from Punjab.

- In case of join application GI Basmati from India and Pakistan, the Basmati market could be better under flexible control, complying with both EU regulation and international trade habits. The larger definition of Punjab, including ancient Punjabi districts in India, will allow to increase production and yields in a minor extent. High price will encourage borderline behaviors, then quality and traceability controls will be a key issue. Hence, the split of Basmati market may be foreseen into Europe more sensitive to PGI label, and Asia more sensitive to aroma due to consumers' experience. This scheme may be compatible with the previous one, allowing a core GI Basmati from Punjab coexisting with broader parentage coming from different provinces of India, Pakistan or from other countries.

Conclusion

In case of Geographical Indication, the issue of the territorial delineation becomes crucial. The historical Punjab is wider than the two present Pakistani and Indian ones. In that respect, a join application for GI is still pending for the Pakistani and Indian Governments. According to present state of join discussion, this will be a big challenge.

[12] Basmati rice (organic) from Italy is already sold on the European market.

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Separate application of Basmati from Pakistan and/or Basmati from India will probably facilitate in future an application of Basmati from any place like Texas or Nepal. This issue should be considered consequently, as Basmati growing area may move since the water supply in Punjab will suffer of announced melting of Himalayan glaciers from 2050. However, global warming is supposed to hamper rice world wide production as yields would dip 10% for every 1° C increase in minimum temperature during the growing season (Basmati on-line, 2007). Hence, the competitive position of Basmati among other rice varieties may not be too much affected, despite probable more frequent shortages. This change may probably reinforce the Basmati market governance by traders, as "Punjab" benefits from a very good unaided recall among consumers, when thinking about Basmati.

Further research works may explore the Indian side of this key production in Asia. An other major issue would be to explore how marketing Basmati may operate with different protection schemes such as seed vs GI, and where the added-value may emerge among the Basmati rice commodity chain with e-auction system. It was recently demonstrated that the competition-auction system creates added-value for growers of specialty coffee (Donnet et al., 2007). Will it be similar for specialty rice such as Basmati?

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