

## Speciality rices of the world: Effect of WTO and IPR on its production trend and marketing

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Received 18 December 2002, accepted 17 April 2003.

### Abstract

There are 20 recognised species of rice out of which only *Oryza sativa* and *Oryza glaberrima* are cultivated. These produce “common” rice consumed by over 5 billion people globally. A few varieties of *Oryza sativa* produce rice of uncommon kind in terms of aroma, kernel colour and chemical composition, termed as “speciality rices”. With the growing prosperity, demand for such speciality rices is growing. Demand for long-slender grained Basmati is growing in India and Pakistan dramatically. Immigrant Asians and even locals in Middle East, European and American countries prefer the best quality Basmati or Jasmine (Khao Dawk Mali or Hawm Mali) rice at any price. Thus it is estimated that demand can not be met at any given time in the foreseeable future. Glutinous or waxy or “boutique rice” or soft cooking rices sell at 50% higher price than common rice. There is upcoming demand for “black rice” from USA and EU for its value as health food and organic food colour. New speciality rices like special aroma rices, special colour rices, special nutritive rices etc. are being developed globally. Additionally, a number of traditional aromatic rice varieties can be projected as alternative to Basmati. Biotechnological tools have just produced experimental “yellow rice” or “golden rice”. But WTO must protect the producers of speciality rices by firmly implementing its regulatory provisions under “Minimum Market Access”, AoA, TBT and TRIP. Provisions of WTO and agreements of TRIP seek to promote effective and appropriate method of implementing the provisions of the agreement with the countries own legal system and practice. Under a strong WTO, transparency of its regulations and honest implementations of its provisions, prospects of speciality rices seems safe, sound and bright. The growth rate should be phenomenal, and producers and traders should be ready to benefit.

**Key words:** Speciality rice, WTO, IPR, rice marketing, rice economy, aromatic rice.

### Introduction

Rice, the second largest cereal crop, is the staple food for half of world's population. Humanity in 135 countries uses rice and its by-products in hundreds of ways<sup>1,2</sup>. Ninety five percent of the rice is produced and consumed in Asia. In Europe and North America it is coming up. Rice provides protein of high nutritional quality, and also enough minerals, vitamins and fibre. Only 5% of the rice grown are used in processed foods, industrial products and alcoholic beverages; 95% is consumed unprocessed. Rice is the least mobile, only about 5% of it enter in world trade. World wide, 26 leading rice-producing countries account for 96% of global rice production. Eighteen of these countries are located within South, Southeast and East Asia. The 8 countries outside of the region (Brazil, USA, Russia, Egypt, Madagascar, Colombia, Iran and Nigeria) jointly produce less than 4% of the world's rice. There are more than 20 species (Table 1) of rice (*Oryza* genus) but only two species, *Oryza sativa*, which originated in the humid tropics of South and Southeast Asia, and *O. glaberrima* originated in Niger basin in Africa, are cultivated. *O. sativa* due to its better yields and adaptability to local growing conditions is grown world wide, cultivation of the latter is limited to parts of West Africa. Scientists believe that rice was originated in the humid tropics of Gondwanaland about 135 million years ago. Russian geneticist N. I. Vavilov proposed that rice originated in ‘The Hindustan Centre of origin’, an area which extends from Assam, in India to present day Myanmar, Thailand, Malaysia and Indonesia. Based on isozymic classification Asian cultivated rice were classified in six different groups<sup>3</sup>. Group I, found throughout the tropical Asia. Group II, has Aus rices of Bangladesh, while Group III and IV are deepwater rices. Basmati belongs to Group V, and Group VI includes temperate and tropical japonicas.

In *indica* and *japonica*, there is tremendous variability for grain

shape, size, colour and chemical composition. There are various categories of physical qualities like long slender to short bold types. There are various degrees of aroma superimposed in various grain shapes. Over and above are various quantities of amylose, and amylopectin, which affect cooking quality and use to which a particular variety can be put to. The endosperm colour also varies from white to various shades of translucent to red to purple to black. *Oryza glaberrima* does not have those varieties in grain quality.

**Major groups of speciality rices :** The speciality rices are those which are not common. Other than amylose, shape and size, endosperm colour and aroma make important criterion to class a rice grain quality. Out of the available range of physical and chemical properties of the grain, rice encompasses a wide range (Table 2). Based on Amylose content (AC) rice varieties were classified<sup>4</sup> into 5 groups namely; Waxy (0 – 5.0 %), Very Low (5.1 – 12.0 %), Low (12.1 – 20.0 %), Intermediate (20.1 – 25.0 %), and High (> 25.0 %). Rices, which are peculiar in one or the other aspects, are classed as speciality rice, and due to that their prices are high. Parboiled rice (various systems produce various kind of products) are popular in India, Bangladesh, Sri Lanka, South and South West African countries, Saudi Arabia, Nigeria, and limited quantity in US and Europe.

**Aromatic rices:** There are a number of aromatic rices known in various countries<sup>1,5</sup>. In Asian countries like India, Pakistan, Thailand, Bangladesh, Nepal, Iran, Afghanistan, Myanmar these are prized the most and sold on premium price to elite consumers in local and export markets. Local consumers have many locality specific varieties, while the export depends on a few selected ones. Hundreds of locally adapted aromatic varieties are grown and con-

sumed in India alone <sup>6</sup>, while export depends on only one i.e. Basmati<sup>7</sup>. Similarly, in Thailand, there are many locally adapted aromatic ones, but the export depends on KDML 105 (Khao Dawk Mali or Khao Hawm Mali, or Hawm Mali) and Jasmine exclusively <sup>8</sup>. The locally adapted ones differ in degree of aroma, grain shape and size, and more for morpho-agronomic characters. The Thai aromatic rice Khao Dawk Mali has lower amylose (< 20.0%) than Indian and Pakistani Basmati (22 to 25%).

In China during 1985-1997, a total of 61 modern aromatic varieties were released to farmers, of which 47.5% is of indica and 52.5% japonica. There are also special aroma varieties, unlike Basmati or Jasmine rice, which serve special need of the special processing industry for speciality product, like Chocolate aroma rice and Roast aroma rice in RO Korea (Dr. Huhn Pal Moon, Suweon ROK *pers. comm.*). In Pakistan Basmati 370 was first developed at Kala Shah Kaku in 1933. Later Basmati based varieties like Basmati Pak (also Colonel Basmati) in 1968, Basmati 198 in 1972, KS282 in 1982, Basmati 385 in 1985, and Super Basmati in 1996, were bred. In India, where Basmati 370 is still popular, more than 28 varieties based on it were released during 1969 to 1996 <sup>9</sup>.

It is known that the major aroma compound is 2-acetyl-1-pyrroline, but this just like “popcorn aroma”. Rice aroma is very complicated and probably numerous oils, phenolics and organic compounds are involved. That is the reason that most aromatic varieties are unique, although a very simplified system of their classification into Nonscented, Scented, and Slightly Scented has been proposed <sup>10</sup>. It was reported <sup>11</sup> that Suyunuo, one of the famous scented rice in China, had a total of 58 compounds involved, among which 2-acetyl-1-pyrroline was considered as the main contributor to the characteristic aroma with the concentration of 660 ppb in the variety. Rice aroma according to most Indian and Chinese reports, is controlled by recessive gene(s) without cytoplasm effect <sup>1,9,11</sup>. In the crosses between the aromatic A line and non-aromatic R line, each grain of F<sub>1</sub> was non-aromatic and hybrid rice grains (F<sub>2</sub> progenies) segregated into ratio of non-aromatic 15:1 aromatic <sup>12</sup>. In the crosses of both aromatic parents, each grain of F<sub>1</sub> and F<sub>2</sub> was aromatic. They found that in aromatic hybrid rice program: (1) If aromatic CMS Line crossed with aromatic restorer with same allele of aroma, each grain of hybrid rice is aromatic; (2) If aromatic CMS Line crossed with non-aromatic restorer, 6.25% grains of hybrid rice are aromatic; (3) If the aroma is controlled by single recessive gene. The 25% grains of hybrid rice are aromatic.

**Colour rice:** The colour rice refers to rice kernel with red, purple or black colour (Table 3), which are formed by deposits of large amount of anthocyanin pigment in different layers of pericarp, seed coat and aleurone. The annual acreage of the coloured rice in China is about 0.4 million ha, which is 1.26% of the total rice cropping areas. The coloured non-milled rice normally used in grand ceremonies and food processing industry. It can be made into cakes, porridge, sweet dumplings, biscuits, noodles, New Year cakes and rice wine etc.

**Red rice:** Red rices are distributed in many countries of Asia but in Southwest and East China, reds mostly belong to *indica* group. Based on the data of the National Crop Gene Bank in Beijing in 1990, of 31,663 accessions of rice germplasm in China, 20.7 %

had red grain<sup>4</sup>. Red rices adapt better unfavourable environments, and are also nutritionally superior, rich in iron and zinc. However their export potential is yet to be explored.

**Black rice:** Black rices (Tables 3, 4, and 5) are another speciality rices from Asia. Analysis of 46,000 accessions from Chinese gene bank and 75,000 from IRRI gene bank it was revealed <sup>13</sup> that China is the richest (62%) country in black rice resources followed by Sri Lanka (8.6%), Indonesia (7.2%), India (5.1%), the Philippines (4.3%), Bangladesh (4.1%), and few in Malaysia, Thailand and Myanmar. The black rice is mostly centred in waxy endosperm in indica as well as japonica backgrounds. In China “Heinuo” group of black waxy rices ranges from purple-brown, purple-black to dark-black colour grains. Black rices, also called “Black-Pearl” are cooked as porridge and foods for health recovery. Another variety Jiegunuo is nicknamed meaning “Recovery of Broken-Bone”. China developed more than 54 modern black varieties with high-yielding, good quality and multiple resistance. Black rices contain (37.6 % higher protein, 22.4 % higher fat and 178.6 % higher crude fibre. Besides health value (Tables 4, 5), there is upcoming demand of black rice as organic food colouring agent. Inheritance of the red pigment has been reported as F<sub>2</sub> segregation ratio of 3 red : 1 white. Two complementary dominant genes, and at least three pairs of genes with dosage effect were reported to control the inheritance of black colour in rice grain by various workers <sup>14</sup>.

**Soft rice:** Soft rice refers specially to the indica rice with very low amylose content. The cooked quality of soft rice is between waxy and indica because its amylose content is below 10%, normally at 5-8%. However, most soft rices have higher gelatinization temperature. Soft rice is mainly distributed in Dehong, Baoshan, Gengma, Yunhe, Shuangjiang and Yongde counties in Yunnan Province, and planted in rice paddies at altitude 800 - 1000 m above sea level with rich rainfall and heat. The cooked rice produced by soft rice is soft, tasty and refreshing, and still keeps soft when cool. It can be served in either hot or cool and tastes elastic. The famous local cultivars are Haomin, Haopi, Haodilahoo, Haomuxi, Haojiehai, Erwanghanduo, Haoanmen, Haoannong and Babaomi etc. Zhefangba in Luxi County abounds with soft rice, which is generally called Zhefangmi. They are *indica* cultivars with big and long grain and jade colour <sup>15</sup>.

**Glutinous or waxy rice:** It is also recognised that the centre of origin of the glutinous rices is Laos, Northeast Thailand. On a per capita basis, Laos is the largest producer and consumer of glutinous rice. Approximately 85% of annual rice production are of glutinous types. Enormous diversity for physical characteristics, quality, and adaptation to specific environmental conditions, exists in the glutinous varieties also. In Cambodia the names of the glutinous varieties start with the word “Damnoeub”, and are used for cake, sweets etc. A unique feature of many of the traditional glutinous and non-glutinous rices from Laos is their aromatic character. A complex character that is genetically determined but the expression of which is also strongly influenced by environmental factors. The most commonly used word is *Hom*, meaning aromatic; it is sometimes used in association with words to indicate maturity time - *Hom do* (aromatic, early) or the size of the grain *Hom*

*gnay* (aromatic, large grain), and *Hom noi* (aromatic, small grain) etc. Among glutinous varieties amylose ranges from 2.6% in the variety *Mae hang* (divorced woman) to 4.8% in *Pa la* (flat fish), and have the lowest amylograph consistency and gelatinization temperature, which is preferred property of waxy rice varieties.

**Boutique rice:** The 'boutique' rices combine the glutinous endosperm and aromatic characters. Many traditional Lao rices belong to this group. These types of rices are also grown and consumed in Thailand and Cambodia. The 'boutique' rices are regarded as having greatest potential for the export market. Shangnongxiangnuo, a japonica waxy aromatic variety developed by plant selection from variant of local aromatic cultivar Qingpuxiangjing, is a modern variety with yield of 5.25-7.5 t/ha, nice aroma, and good cooking quality and blast resistance. Zhongxiang 1, aromatic indica rice from the cross of 8066/Aihei by CNRRI, is a high yielding variety of about 6.75 t/ha with good eating quality. Its female parent 8066 has the blend of Basmati 370. Xiangyou 63, the first aromatic hybrid rice in China, yields 6 - 8 t/ha, and has slender grain and good resistance to BB. However, its female parent is aromatic CMS line 80-66 is an indica aromatic pure line bred by Hunan AAS in 1985, and an important aromatic and good quality donor widely used by various breeding programs in China. Eleven modern aromatic varieties have been bred and released from 80-66 as an aromatic donor.

**Wine rice:** China consumed about 2 million tons of food grains in wine brewery each year. The total consumption of wine rice is expected to exceed over 1 million tons for wine industry in China. There is *japonica* wine rice and *indica* wine rice in China. The wine rice usually is waxy in China while it is of japonica, non-waxy in Japan. The waxy wine rice must have high percentage of hulled, milled and head rice recovery, less than 2% amylose, 5-6% protein, less oil, overall milky endosperm with nice lustre, fast water absorbency capacity and starch particles easily fermentable. The japonica waxy rice is superior to the indica waxy rice in term of the quality and output of rice wine. The "Yellow Rice Wine" produced by japonica waxy wine rice is a famous rice wine in Zhejiang Province. Improved varieties are bred now to brew purple and black wines<sup>15</sup>.

**Nutritional quality:** Rice considered as the source of carbohydrate, but may offer improved nutrition (protein, minerals, and vitamins) for the billions of people who depend on rice as a staple. It is estimated that around 60% of all pregnant women and 40% of school children in Asia are iron-deficient which impairs immunity and reduces physical and mental capacities. Besides iron, zinc is also an important micro-nutrient for a healthy immune system and it combats diarrhoea and cholesterol accumulation in blood vessels. It is also known to enhance the body's capacity to absorb iron. IRRI discovered a line, IR68144, which was previously designed to tolerate low temperature, having a high content of iron and zinc (Table 6). Genetic enrichment of rice for iron, zinc, other minerals and vitamins may benefit billions of people at no extra cost to them. The latest high-tech version of rice like "Saffron

Rice", "Golden Rice" or "Yellow Rice", has been genetically engineered to contain  $\beta$ -carotene, the precursor to vitamin A, as well as a healthy dose of iron<sup>16</sup>. But it is still experimental and not for production or trade.

**Wild rice:** Wild rices have wild prices. In India, the wild rice (*Oryza nivara*) is eaten on special fasting occasions; called *Chhatth* (in September) and *Nav Ratri* (in October). Demand on the quantity is low yet prices are high. *O. nivara* is not eaten due to its 11.3% protein or high amylose but due to its wild origin. Another rice-look-alike is called *Zizania aquatica* and *Zizania palustris* with long slender and black colour<sup>1</sup>. First reported to be collected from the wild by American Indians but now cultivated in USA, Canada, and Hungary under 50 cm to 1m standing water and served in 5 Star Hotels and First Class flights.

**Organic rice:** This is not a type of rice but a process of production. Organic food is becoming increasingly important as it promotes sustainable use of natural resources and assures safe and wholesome nutrition. International trade is expanding (Table 7) beyond the EU, USA, and Japan to Eastern Europe, Australia, China, India etc. During 1997, worldwide sales exceeded US\$10 billion (Table 7), in spite of several constraints (International Trade Centre, 1999). Important issues also are confirming the authenticity of organic rice, and improve yield and quality. The FAO/WHO Codex Alimentarius Commission on Food Labeling recognised the need for a clear definition of "organic" and thus developed the Guidelines for production, Processing Labelling and Marketing of Organically Produced Foods<sup>17</sup>. The guidelines recognise that: Organic agriculture is based on minimising the use of external inputs, avoiding the use of synthetic fertilisers and pesticides and specify the Principles of Organic Production, Permitted Substances for the Production of Organic Foods and the Minimum Requirements and Precautionary Measures under the Inspection or Certification System.

### Rice Production and Market Trends

Rice prices have been tumbling down over last decades (Fig. 1) and various rice research and development organisations have justified the money spent on them. Urban consumers have celebrated the falling food bill but what about the actual producers or traders. Have traders lost any profit margin? Have poor rice farmers gone poorer or become richer? These facts need to be analysed for appropriate policy intervention. The international rice market has grown from an average of about 8 million tons in the 1960s to about 19 million tons in the 1990s (FAO, 1999) and has been basically subdivided into four types — glutinous, aromatic, japonica, and *indica* (Fig. 2). The relative size and rate of expansion of each of these markets clearly reflect the distinct preference of consumers in various countries and regions. The *indica* rice trade is the largest with a share of about 69%. Parboiled rice primarily comes from the US, Thailand, and India and, in small quantity, from Myanmar. Aromatic rice accounts 10-15% of world trade. The volume of aromatic rice trade has greatly expanded over the years. In 1996, aromatic rice trade was 50% higher than the 1.7 million tons averaged between 1990 and 1994 compared with 600,000 tons traded 10 years ago<sup>18, 19</sup>. The three major exporters of aromatic rice are Thailand, India and Pakistan. Aromatic rice commands significant price premium though these premiums have been eroding due to quality control and mixing with non-aromatic look-

a-likes. The Basmati rice market is focused in the Middle East and Saudi Arabia. Thai fragrant rices Khao Dawk Mali and Jasmine, are sold primarily to Asian markets, particularly Hong Kong, Singapore, and Malaysia. Demand from China for Jasmine has also risen dramatically in recent years as they substitute for the low-quality hybrid rice. The US is a growing market for Jasmine rice, not because of rapid expansion of the country's Asian population but due to wider acceptance by U.S. consumers. The japonica rice market is about 10% of total rice trade, demand for which is relatively limited to Turkey, Japan, Jordan, the Koreas, and Papua New Guinea but sold on premium price. When traded into what is normally an *indica* market, it is usually sold at a discount. The glutinous rice (also known as waxy or sweet rice) market is a very small market, averaging only about 275,000 tons per year between 1992 and 1996. This has expanded significantly from the average world trade of 100,000 tons per annum in the 1980s. Crop shortfalls in areas where it is a staple crop (Laos) periodically causes world trade volume to soar to 300,000 or 400,000 tons. Demand for speciality rices is expected to grow (Table 8).

### WTO, Agricultural Subsidies and Rice

World Trade Organization (WTO) was set up with high goals to globalise market opening and export promotion following common rules. It was expected to provide the common institutional framework to conduct trade among its members as per agreement under Uruguay Round of GATT<sup>20</sup>. The Uruguay Round has been described as the turning point in the evolution of agricultural policy. Three Agreements under the purview of WTO are relevant for the discussion. First, Agreement on Agriculture (AoA) has provisions of *Improving Market Access; Reducing Domestic Support; Reducing Export Subsidies* basically to remove post-production and trade-distorting practices. Second, Agreement on Technical Barriers to Trade (TBT) recognises conformity of member countries to technical regulations and standards not to create obstacles. Third, Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) provides adequate intellectual property rights and effective enforcement measures to protect those rights<sup>5, 20</sup>.

**Provisions:** Domestic Support Measures are granted through General Services, Direct Payments to Producers, Public Stockholding for food Security, and Special and Differential Treatment (SDT). General Services comprise of expenses on research, pest and disease, training services, extension and advisory services, inspection services, marketing and promotion services, and general. Direct Payment to Producers comprise of de-coupled income support, income insurance, crop insurance, structural adjustment, environmental programmes, regional assistance programmes, and others. SDT comprise of investment subsidies, agricultural input subsidises, and diversification from growing illicit narcotic crops. Domestic Support Measures for most developing countries fall within the range of 10% *de minimis* level thus these countries may even increase domestic support without breaching the WTO rules. Some of these countries may even increase their current level of domestic support. Investment in agricultural research which is less than 1% of agricultural GDP in developing countries (in India < 0.5), as compared to 3% in USA.

Effect of GATT on rice would neither be through demand nor through production but through trade. Like Basmati export to EC

was expected to rise due to reduction in import duty. World rice trade would be boosted<sup>20</sup> including the earning from it for trader and producer. Although the rise in prices at the world level, coupled with use of tariffs, can lead to more appropriate incentives to producers, most developing countries will need to evolve targeted forms of assistance that can be implemented at low budgetary level. But developing countries would have no money to support that.

**Production policy options:** In general the total support to be provided to agricultural producers in developing countries in the future would compose of:

- AMS related support
- *de minimis* support
- SDT related support
- production limiting support
- Green box support

Aggregate Measurement of Support (AMS), which is the sum of non-exempted domestic support (general services like research etc, direct payment to producers, and special and differential treatment) are promised for reduction<sup>5</sup>. This reduction was to start from 1995 was to be brought down to 20% for developed countries and 13.3% for developing countries. The current level of AMS has been fairly high in the developed countries (27 to 83.5 %) compared to low one digit in developing countries. In developing countries that AMS mainly stemmed from subsidies in inputs, which could be included into "green box" and easily covered under *de minimis* regulation. But certain exemptions have more market distorting effect though according to countries, their farmers need to be supported to maintain their way of life. This is where Japan would like to side with EU. None of these would benefit to boost the production or profit of producer or boost export of agricultural commodities of rice producing and exporting countries. AMS related support has to be brought down by 13.3% over the base year i.e. 1986. But most developing countries admitted their AMS to be almost zero, losing any options for future. If the price support is less than 10%, it can be covered under *de minimis*. Lower the share of the marketed output, higher is the price support that can be provided. For example, if we assume that the marketed output represents a share of 25% of total production, then the 10% *de minimis* clause could be equivalent to a 40% price support on marketed output. Thus this is a big hope for developing countries that would be exporting Speciality Rices. Any support above *de minimis* has to come from Green Box. Special and Differential Treatment (SDT) would be a relief in form of subsidised inputs, subsidies investment or stoppage of illicit drug production. Production limiting support is of no use for speciality rices, as it is already below the demand level. Apart from the multilateral discipline under the WTO, expenditures on domestic support policies may be subject to other constraints. Those countries, which are implementing structural adjustment programme (SAP), are under obligation to reduce government intervention in input and output market. Thus they would have no capacity to pursue expensive support to producer through any policy.

**Grandfather clause on export subsidy:** Use of export subsidy under new WTO rules may be summarised as follows. First, there is prohibition on the use of export subsidies listed in Article 9:1 of the Agreement (AoA) in excess of the budgetary outlay and

**Table 1.** *Oryza* species, genomic constitution and chromosome number.

Species	Genome	2n	Species	Genome	2n
<i>O. sativa</i>	AA	24	<i>O. punctata</i>	BB, BBCC	24, 48
<i>O. glaberrima</i>	AA	24	<i>O. latifolia</i>	CCDD	48
<i>O. rufipogon</i>	AA	24	<i>O. grandiglumis</i>	CCDD	48
<i>O. nivara</i>	AA	24	<i>O. alta</i>	CCDD	48
<i>O. longistaminata</i>	AA	24	<i>O. australiensis</i>	EE	24
<i>O. barthii</i>	AA	24	<i>O. brachyantha</i>	FF	24
<i>O. glumaepetula</i>	AA	24	<i>O. granulata</i>	GG	24
<i>O. meridionalis</i>	AA	24	<i>O. meyeriana</i>	GG	24
<i>O. officinalis</i>	CC	24	<i>O. ridleyi</i>	HHJJ	48
<i>O. eichingeri</i>	CC	24, 48	<i>O. longiglumis</i>	HHJJ	48
<i>O. rhizomatis</i>	CC	24	<i>O. schlechteri</i>	??	48
<i>O. minuta</i>	BBCC	48	<i>O. neocaledonica</i>	?	24

**Table 2.** General range in rice grain quality for various properties.

Property	Raw	Parboiled
1. Alkali test values:		
• Spreading	2.2 – 7.0	1.1 – 6.0
• Clearing	1.2 – 6.0	3.0 – 5.7
2. Amylose, % dry basis	2.0 – 27.2	2.0 – 27.4
3. Aroma	Non-aromatic, strongly aromatic, special flavour	Non-aromatic, strongly aromatic, special flavour
4. Gel consistency	Soft, medium, hard	Soft, medium, hard
5. Hardiness (K iya tester):		
• Breaking, kg	4.6 – 6.4	6.3 – 12.1
• Crushing, kg	7.8 – 9.9	14.4 – 16.3
6. Head rice (% of milled rice)	42.4 – 92.6	99.4 – 100.0
7. Kernel colour	White, red, purple, black	White, red, purple, black
8. Polished kernel clarity	Transparency: – translucent, chalky, colour	Transparency: – translucent, chalky, colour
9. Protein %	4.0 – 17.0	4.0 – 17.0

**Table 3.** World distribution of black rice resources <sup>13</sup>.

Country	No. of Acc.	%	Country	No. of Acc.	%
China	359	61.6	Nepal	2	0.3
Japan	5	0.9	Sri Lanka	50	8.6
Philippines	25	4.3	India	30	5.1
Thailand	10	1.7	Bangladesh	24	4.1
Vietnam	4	0.7	Pakistan	1	0.2
Laos	2	0.3	Libya	2	0.3
Indonesia	42	7.2	Nigeria	2	0.3
Malaysia	13	2.2	Other	4	0.7
Myanmar	8	1.4	<b>Total</b>	<b>583</b>	<b>100</b>

**Table 4.** Vitamins and minerals of non-milled black and normal rice <sup>22</sup>.

Name	Vitamin (mg/100g)				Mineral element (mg/100kg)							
	B <sub>1</sub>	B <sub>2</sub>	C	E	Fe	Ca	Mg	Zn	P	K	Cu	Se
<b>Black rice:</b>												
Yangxianheimi	0.204	4.44	0.86	48.89	210	214.3	2640	43.5	3710	3734	2.7	0.061
Heizhenmi	0.326	2.54	0.30	53.44	146	142.8	2520	45.5	4213	3402	2.1	0.130
<b>Normal rice:</b>												
Basmati 370	0.166	2.22	0.08	46.64	73	71.4	1980	52.5	3404	2406	2.5	0.083

**Table 5.** Nutrient components of some Chinese black rices <sup>23</sup>.

Name of variety	Origin	Lysine (%)	Protein (%)	Fat (%)	Crude Fibre (%)	Thiamine (mg/100g)	Riboflavin (mg/100g)
Dehong Zimi	Yunnan	0.34	11.02	3.21	0.6	0.44	0.26
Huishui Heinuo	Guizhou	0.33	11.01	3.31	0.5	0.42	0.25
Donglan Heimi	Guangxi	0.32	9.98	2.86	0.6	0.43	0.29
Rongxian Heinuo	Guangxi	0.30	10.56	2.96	0.7	0.40	0.27
Shaoguan Heinuo	Guangdong	0.29	10.00	3.02	0.8	0.41	0.26
Yunxiao Zimi	Fujian	0.28	9.76	2.72	0.4	0.38	0.28
Hanzhong Heinuo	Shaanxi	0.47	11.36	3.18	0.7	0.54	0.24
Heiyouzhan 33	Guangdong	0.51	13.10	3.06	0.7	0.68	0.28

**Table 6.** Iron and zinc content of some rice varieties

Variety / Line	Nutrient content (mg / kg) of rice	
	Iron	Zinc
IR 36	10.1	31.4
IR 72	11.7	32.5
IR 74	13.0	36.4
Xua Blue Nuo	22.5	46.6
Banjaiman	22.7	53.0
Zuchem	23.4	51.0
Ganjay Roozy	26.4	58.9
IR68144	21.0	34.0
<i>O. latifolia</i>	14.4	54.0

**Table 7.** World market for organic food and beverage <sup>24</sup>.

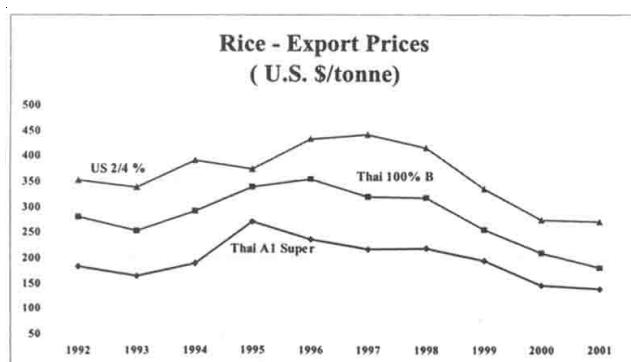
Market	Appropriate retail sales (US\$ million)	% of total food sales	Expected growth rate over the medium term (%)
Germany	1800	1.2	5-10
France	720	0.5	20
United Kingdom	450	0.4	25-35
Netherlands	350	1.0	10-15
Switzerland	350	2.0	20-30
Denmark	300	2.5	30-40
Sweden	110	0.6	30-40
Italy	750	0.6	20
Austria	225	2.0	10-15
Other Europe*	200		
<b>Total Europe</b>	<b>5255</b>		
United States	4200	1.25	20-30
Japan	1000		

**Table 8.** Projected demand (1000 t) for high-quality rice <sup>24</sup>.

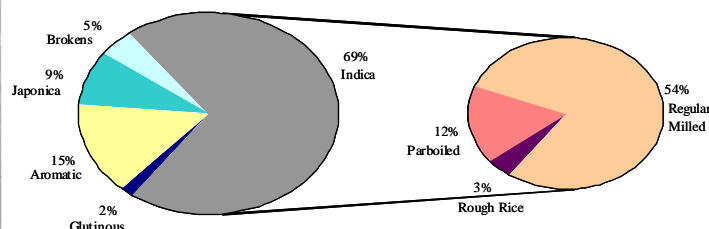
Country/Region	1993	2010	2020	% Change
				(1993-2020)
Latin America	4,725	6,091	7,114	51
Sub-Saharan Africa	245	419	566	131
West Asia and North Africa	2,197	3,283	4,096	86
Asia	14,818	19,776	21,482	45
South Asia	7,953	11,164	12,395	56
South-East Asia	2,279	2,752	2,779	22
East Asia	4,586	5,861	6,308	38
Developed	5,076	6,038	6,777	34
Developing	21,985	29,570	33,259	51
World	27,061	35,608	40,036	48

**Table 9.** Subsidy as % of gross farmers' income during 1999-2001<sup>19</sup>.

S. N.	Country	% of gross farm income from subsidies
1	Switzerland	72
2	Norway	66
3	Japan	60
4	EU	43
5	USA	26
6	New Zealand	11
7	Australia	9
8	Poland	3
9	Asia except Japan	less than 1



**Figure 1.** Declining rice price trends during the last decade.



**Figure 2.** Rice trade, type and quality, 1996 (Source : Slayton, 1997)

quantity commitment levels specified Section II, Part iv of a Member's Schedule. Second, there is prohibition on the use of these export subsidies on, or a "zero commitment" with respect to, any agricultural product not specified in that Section of a member's Schedule. Third, other export subsidies (those not listed in Article 9:1) may not be used to circumvent commitments under the Agreement<sup>21</sup>. But is it so? A close look may reveal loopholes. The new US Farm Security and Natural Investment Act 2002, which authorises government to hike farm subsidy by US\$190 billion over next 10 years, against the WTO set limit of US\$19.1 billion. This sends wrong signals to other member countries whose limits have also been set like for EU 60 billion, Japan 30 billion and agreed in the Doha Conference. Developing countries who are and would be the main exporters of Speciality rices have no such capacity to support their farms or farmers. Thus US, EU and OECD should not try to advance the WTO timetable on wrapping the negotiation, and rather translate the WTO ideals and recommended for orderliness into action without modifying or circumventing it.

**Some real illustrations:** Developing countries face considerable changes in world market conditions, while still confronting a complex policy agenda (The Economist, London 13 -19 July 2002):

\*Only 4% of EU population work in agriculture yet 50% of EU budget is spent as agricultural subsidies.

\*During 2000 EU paid to their farmers €104 billion (US\$ 103 billion) compared to €50 billion to American farmers by USA (Table 8).

\*EU farmers get 35% of their income from subsidies compared to 21% in the United States and just 1% in New Zealand.

\*European consumers and third-world countries pay a heavy price for all this generosity.

\*EU offered to drop its tariffs on goods from 49 poorest countries, but sugar and rice left out.

Why European Union is fending imports and protecting their fat farmers? Not for food security but to bow to the strong farm lobby. Food Security was achieved in Europe decades ago thus subsidies now simply encourage "wine-lakes" and "butter-mountains." Possibly WTO has teeth to smoothen this issue in its 5<sup>th</sup> September 2003 meeting in Mexico without letting the concerned countries hide the farm subsidies into some thing else. If that happens, imagine "Basmati" growing in a developed country with full production subsidies, and poor Indian and Pakistani farmers competing with them? The point was brought out very clearly by the President, Vice President and Prime Minister Sri Lanka, Philippines, and Thailand respectively during the June 2002 World Food Summit in Rome "WTO should protect the interests of the poor nations. Heavy farm subsidies of the industrialised nations are causing persistent poverty of small farmers in developing countries. The disturbing fact is that economic policies in developed countries effectively prevent poor countries from trading out of poverty."

**Geographic indicators:** French *Champagne* has been quoted as famous case of Geographic Indicator (GI) whereby the product is known from the area it is produced. Thus the name is protected and can not be used by any other country or region. India and Pakistan are giving the same plea to *Basmati*, which is grown in

the northern part of India and central Pakistan. It is common knowledge that *Basmati* is produced and exported from these two countries only. Thus when controversy was brought in by *Basmati* from Texas, USA, it is natural for India and Pakistan to ask for protection under it. If the protection is given, *Basmati* can continue to be produced in its native place. In case of different standards of world bodies, *Basmati* will be grown and exported from anywhere. The other kinds of speciality rices may also be considered under geographic indicators if not protected under other provisions of WTO, GATT and TRIP.

### Conclusions

Common rice (*Oryza sativa*), the food for 5 billion people of the world also offers food for upper strata of the society, who have means and taste for it. The 20 recognised species of *Oryza* and the varieties of two cultivated species namely, *Oryza sativa* and *Oryza glaberrima*, offer can be used to produce uncommon or "speciality rices" (different in terms of aroma, kernel colour and chemical composition). The price of common rice has fallen from US\$300 per ton of 1980s to US\$120 per ton in 2002. But with the growing prosperity, prices for "speciality rice" has increased and demand is growing fast. The long-slender grained *Basmati* of India and Pakistan, and Jasmine (Khao Dawk Mali or Hawm Mali) of Thailand, Glutinous or waxy or "boutique rice" of Japan, China and other SE Asian countries fetch highest price. Demand for "black rice" is growing fast from USA and EU for its value as health food and organic food colour. But WTO must protect the producers of speciality rices by firmly implementing its regulatory provisions under "Minimum Market Access", AoA, TBT and TRIP. Provisions of WTO and agreements of TRIP seek to promote effective and appropriate method of implementing the provisions of the agreement with the countries own legal system and practice. Once farmers are assured of proper value and countries assured of the right, the growth rate should be phenomenal, and all should be ready to benefit.

### References

- <sup>1</sup> Chaudhary, R.C. and Tran, D.V. (Eds.) 2001. *Speciality Rices of the World: Breeding Production and Marketing*. FAO, Rome, Italy 358 pp.
- <sup>2</sup> Hicks, A. 1998. "The potential for rice products and by-products in Asia. 3rd Ann. Asia Int. Rice Conf., Phuket, Thailand, 19 pp.
- <sup>3</sup> Glaszmann, J.C. 1987. Isozyme and classification of Asian rice varieties. *Theoret. Appl. Genet.* **74**: 21 -30.
- <sup>4</sup> Juliano, B.O., and Villareal, C.P. 1993. *Grain Quality Evaluation of World Rices*. IRRI, Philippines.
- <sup>5</sup> FAO 1999. *FAO Trade Related Technical Assistance & Information*. FAO Rome, Italy; 24 pp.
- <sup>6</sup> IRRI 1996. *Report of the INGER Monitoring Visit on Finegrain Aromatic Rice in India, Iran, Pakistan, and Thailand*. IRRI, Philippines, 128 pp.
- <sup>7</sup> Shobha Rani, N., Thapar, B. K., Lodh, S. B., Sidhu, G. S., Chaudhary, D., and Jena, K. K. 1996. *In*, Report of the INGER Monitoring Visit on Finegrain Aromatic Rice in India, Iran, Pakistan, and Thailand. IRRI, Philippines, 45 - 64. IRRI, Philippines.
- <sup>8</sup> Narula, A. and Chaudhary R.C. 2001. Current Status and future of the famous aromatic rice variety Khao Dawk Mali in Thailand. pages 163 - 174; *In*: *Speciality Rices of the World: Breeding Production and Marketing*. FAO, Rome, Italy 358 pp.
- <sup>9</sup> Kumar, S., Shobha Rani, N., and Krishnaiah, K. 1996. *In*: Report of the INGER Monitoring Visit on Finegrain Aromatic Rice in India, Iran, Pakistan, and Thailand. IRRI, Philippines, 21- 44 pp. IRRI, Philippines.
- <sup>10</sup> INGER 1996. *Standard Evaluation System for Rice*, IRRI, Philippines, pp 52.

- <sup>11</sup> Yu, B.Y., Wang, J., and Gu, M.H. 1990. In: *Advances in Genetic Research of Quality Characters in Cereals*. Jiangsu Sci. & Tech. Press Nanjing, China, 100-105 pp.
- <sup>12</sup> Ren, G.J., Lu, X.J., Zhang, C., and Cheng G.H. 1999. *Chinese J. Rice Sci.* 13: 51-53.
- <sup>13</sup> Tang, S. X. 1995. In: *Special Rices in China*. Shanghai Sci. & Tech. Press, China.
- <sup>14</sup> Wu, S. Z., and Huang, C. W. 1998. *Guangdong Agri. Sci.* 3: 5-6.
- <sup>15</sup> Zheng, J.G. 1995. In: *Special Rices in China*. Shanghai Sci & Tech. Press, China.
- <sup>16</sup> Gura, Trisha 1999. *New Genes Boost Rice Nutrients*, *Science*, August 13: 1999, pp 994-995.
- <sup>17</sup> De Haen, H. 1999. *Producing and marketing quality organic products: opportunities and challenges*. Paper presented at the Sixth IFOAM Trade Conf. on Quality and Communication for the Organic Market, Florence, Italy.
- <sup>18</sup> Slayton, T. 1997. *Proc. 4<sup>th</sup> Asian International Rice Conference*, Bangkok, Thailand.
- <sup>19</sup> The International Trade Centre. 1999. *Organic food and beverages: World supply and major European markets*, ITC, UNCTAD/WHO, Geneva, Switzerland, pp. 271.
- <sup>20</sup> FAO 1995. *Effect of Uruguay Round on agriculture*. FAO Rome 102 pp.
- <sup>21</sup> Shanahan, P. 1997. *Export subsidy commitments*. In: *The Uruguay Round and Agriculture in Southern Africa: Implications and Policy responses*. 31- 38 pp., FAO Rome.
- <sup>22</sup> Zhao, C.Z., Qi, X.F., and Yang, C.D. 1993. *Chinese J. Rice Sci.* 7(2): 120-122.
- <sup>23</sup> Ying, C. S., and Zhong, D. B. 1997. In: *Elite Germplasm of Rice in China*. China, Agri. Press.
- <sup>24</sup> Rosegrant, M. W., Agacaoili-Sombilla, M., Gerpacio, R. and Ringer, C. *Challenges and opportunities for Illinois agriculture*. *Proc. Meeting the Demand for Food in the 21<sup>st</sup> Century*. Urbana, Champaign.

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