Review of the rice market situation in 2007[1]

C. Calpe

Senior Economist, Trade and Markets Division, FAO, Rome, Italy

Production

Most recent estimates (Figure 1) show world paddy production to have declined from a record 633 million tonnes in 2005 to 629 million tonnes in 2006: confirmation of the adverse impacts of an erratic monsoon in Asia and the development of an El Niño event in the second half of 2006. Intensive rice cultivation also gave rise to disease and insect attack problems that entailed heavy losses in several Asian countries.

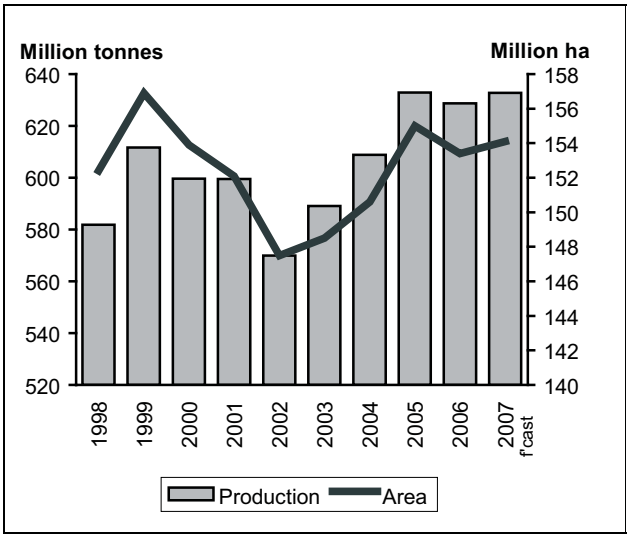
Asia

In Asia, the 2006 paddy season ended on a low: production fell by 3 million tonnes to 569 million tonnes – a reflection of widespread decline across the region, due mainly to the irregular pattern of the monsoon rains.

In Bangladesh, production in 2006 is anticipated to fall to 39.2 million tonnes, well below the initial government target of 44 million tonnes and 1.5 percent less than the 39.8 million tonnes harvested in 2005. The first aus crop was 14 percent smaller than in the 2005 season, reflecting the lack of rainfall and the competition from higher value crops. The main aman crop, harvested between November and January, also suffered from lack of rainfall, as well as fertilizer shortages and rising fuel costs. Likewise, shortages of basic inputs have marred prospects for the third, irrigated, boro crop. Although the Government distributed high-yielding seeds to farmers, severe fertilizer shortages were reported up to early March 2007, leading to farmer unrest and demonstrations in several parts of the country.

China ended the 2006 paddy season with virtually no growth – a reflection of adverse conditions which reduced the size of the intermediate single rice crop (compensated for by a larger late rice crop). The country's semi-official production estimate is 180.7 million tonnes, marginally above the 180.6 million tonnes harvested in 2005.

FIGURE 1
Global rice paddy production and area



The 2006 paddy season ends in Cambodia with the gathering in March of the second (irrigated) crop. The Government predicts a 5 percent increase in production, which would mean a new record of 6.3 million tonnes. A large part of the increase is likely to be destined for the export market. With the harvesting of the second rabi crop in April–May, India completes the 2006 paddy season (Table 1). Preliminary forecasts point to production falling by 1.1 million tonnes in 2006 to 136.6 million tonnes (91.05 million tonnes, milled basis), against an initial target of over 139 million tonnes (92.79 million tonnes, milled basis). The expected year-to-year decline also takes into account the smaller secondary (rabi) crop, which was partly due to the shift from rice to wheat cultivation in the wake of an increase in wheat support prices.

[1] The information contained in this paper is of 30 March 2007.

TABLE 1
India, rice milled production by crop (*million tonnes*)

	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Kharif	77.48	72.78	80.52	63.08	78.62	72.23	78.27	78.54
Rabi	12.20	12.20	12.82	8.74	9.91	10.90	13.52	12.51
Total	**89.68**	**84.98**	**93.34**	**71.82**	**88.53**	**83.13**	**91.79**	**91.05**

Source: Department of Agriculture and Cooperation, India.

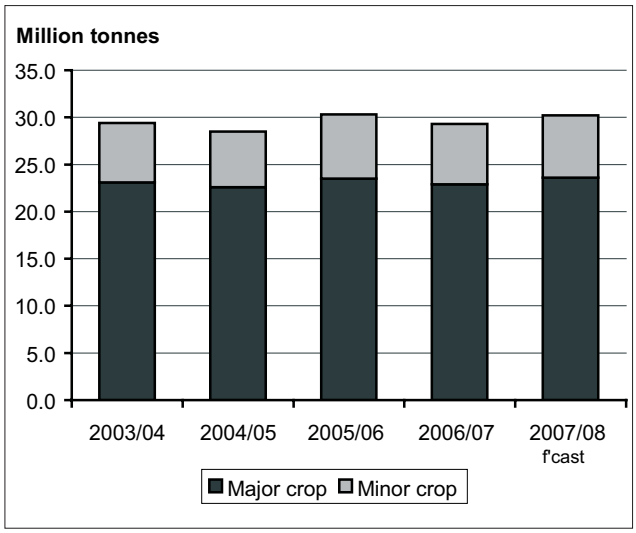
The 2006 season was generally positive for Indonesia, which recorded a small production increase to 54.4 million tonnes – the result of favourable weather conditions, low incidence of pests and diseases, and a marked increase in producer support prices. In Japan, 2006 paddy production dropped by 5 percent to 10.684 million tonnes, due to lack of sunshine and the impact of two typhoons that hit the country in August and September. Official estimates in the Democratic People's Republic of Korea point to a more optimistic outcome for the 2006 season than was previously anticipated, with production at 2 478 521 tonnes and yield at 4.248 tonnes per ha, which would result in a decline of just 100 000 tonnes compared to the relatively buoyant 2005 output. Production in the Republic of Korea fell by 2 percent in 2006, following a reduction in the rice area.

Floods at harvest time contributed to a fall in production in Malaysia. In Myanmar, the 2006 production forecast still stands at 25.2 million tonnes, marginally above the 25.08 million tonnes officially estimated for 2005. Following a downward revision by the Government, paddy production in Pakistan is estimated to have fallen to 8.1 million tonnes in 2006, down from a record 8.3 million tonnes in 2005. The decline mainly reflects the substantial crop losses in the lower Sindh caused by excessive rainfall. Not only was there a reduction in quantity, but the adverse weather conditions impaired the quality of the grain, making it more difficult for exporters to procure suitable supplies to meet contracted sales. There have therefore been strong price increases in the past 3 months, disrupting the normal flow of trade which currently accounts for about 57 percent of production.

In the Philippines, 2006 paddy production (July 2006 – June 2007) has been revised slightly upwards to 15.4 million tonnes, i.e. a 2 percent rise from 2005 and a new record. The increase on the previous season reflects the good main paddy crop grown over the second semester of 2006 (damage from the typhoons that hit the country in the last quarter was limited), as well as positive crop prospects for the period from January to June 2007. Over this period, improved water availability is expected to foster an increase in plantings and yield growth could be sustained by more widespread use of hybrids.

According to the latest official forecast (Figure 2), Thailand harvested 29.4 million tonnes of paddy in 2006 (i.e. 860 000 tonnes less than in 2005). The cut was largely caused by flooding which reduced the area under rice in the northern and central plains over the main crop, but also by unusually dry and cool weather in several north and northeastern provinces which caused problems to the secondary crop harvested in March. The government rice procurement scheme over the main paddy season opened on 1 November 2006 and ended on 28 February 2007. Although the programme made allowances for the purchase of up to 9 million tonnes of paddy from the main 2006 crop, the actual volume pledged by producers amounted to just 1.8 million tonnes, well down on the 5.3 million tonnes procured from the main 2005 paddy crop. This decrease was due for the main part to the high prices that farmers could obtain from private traders and

FIGURE 2
Rice paddy production by crop, Thailand



which rendered the scheme less attractive to them. Procurement for the secondary paddy crop is operational from 16 March to 31 July 2007 and the Government has allocated funds for purchasing up to 2.5 million tonnes at slightly higher prices than those applied over the main season. Indeed, the official prices of the various rice qualities covered by the pledging scheme were all raised by B 100 (baht) per tonne (compared with the main crop), reaching B 6 600 per tonne for 100% white rice, B 6 500 per tonne for 5% broken and B 6 000 per tonne for 25% broken white rice.

In Viet Nam, the latest official estimate of 2006 paddy production was revised downwards from 36.2 to 35.8 million tonnes to take account of the damage caused in the north by a cold spell at the beginning of the season and by the drought in the Red River Delta. Growing regions in the south also incurred losses from drought followed by flooding during the summer/autumn crop-growing period, while severe insect attacks affected 100 000 ha of rice fields in the Mekong River Delta. The sector was also subject to the rising prices of petrol, fertilizers and insecticides. Nevertheless, the level of production (35.8 million tonnes) estimated for 2006 remained virtually unchanged compared with 2005.

Africa

Production in Africa is estimated to have reached 21.6 million tonnes in 2006, i.e. 1.2 million tonnes or 6 percent above the level reached in 2005 and the fifth consecutive year of increases. In the northern part of the region, Egypt officially reported production of 6.528 million tonnes – about 400 000 tonnes more than in 2005 and the highest level on record. This increase reflected the area expansion from 613 300 to 669 100 ha (well above the government ceiling of 420 000 ha), which compensated for a slight drop in yields. Much of the increase in plantings was sustained by strong domestic and export demand which kept producer prices buoyant. In Western Africa, most recent estimates confirm the generally positive outcomes of paddy crops in 2006, consistent with the favourable weather conditions that prevailed over the season and the positive effects of the adoption of NERICA rice varieties, which are spreading in the subregion. Substantial production increases were reported in Burkina Faso, the Gambia, Guinea, Mali, Niger, Nigeria, Senegal and Togo. Gains were spectacular in Burkina Faso, where production rose by 102 percent to 189 175 tonnes. Despite a reduction in plantings, production also increased in Mali, where over 1 million tonnes were harvested in 2006, up from 946 000 tonnes in 2005, as excellent growing conditions boosted yields.

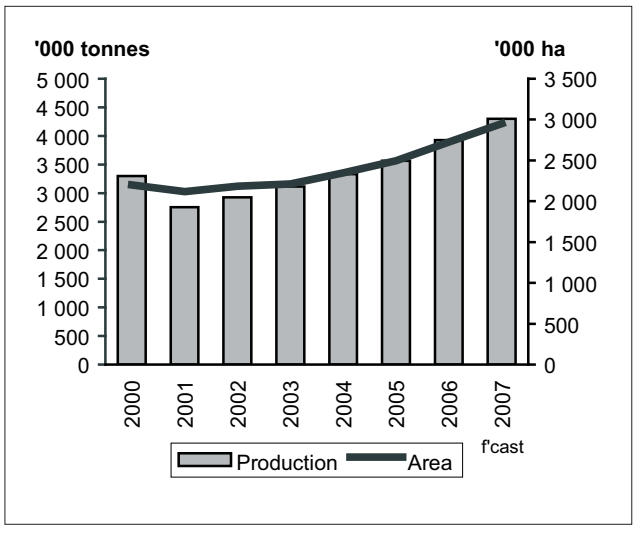
In Nigeria (Figure 3), the tendency for production to rise was confirmed by recently released official figures (with FAO figures even higher). According to the Government, the 2006 harvest was 3.924 million tonnes, i.e. 876 000 tonnes lower than FAO's estimate, but 10 percent above the 2005 official level of 3.567 million tonnes. Growth in 2006 was sustained by favourable weather conditions and by strong institutional support under the "Presidential Initiative on Rice Production, Processing and Export" (in place since 2004).

On the other hand, production in Chad, Côte d'Ivoire and Mauritania is estimated to have fallen in 2006. In southern Africa, good rainfall and improved access to fertilizers and seeds caused production to double in Malawi in 2006. Madagascar also gathered a relatively good crop, now estimated at 3.4 million tonnes, 100 000 tonnes less than the previous forecast and virtually unchanged from 2005. In East Africa, production rose strongly in Tanzania and Uganda, and gains were recorded in Kenya.

Latin America and the Caribbean

Overall, paddy production in Latin America and the Caribbean is estimated to have fallen from 26.4 million tonnes in 2005 to 24.6 million tonnes in 2006, as increases in Central America and the Caribbean failed to compen-

FIGURE 3
Paddy production and area, Nigeria



sate for decreases in South America. In most countries, the paddy season ended positively, thanks to the lower incidence of hurricanes compared with 2005. Overall, production rose from 2.30 (in 2005) to 2.41 million tonnes – a reflection of gains in Cuba, the Dominican Republic, El Salvador, Guatemala and Mexico, which compensated for declines in Costa Rica, Nicaragua and Panama. In the Dominican Republic, production almost achieved self-sufficiency, thanks to the policies designed by the National Rice Committee, representing private and public rice stakeholders, and to the successful national warehouse receipt programme (Programa Nacional de Pignoración), which helps finance storage costs born by rice producers and millers at harvest time.

In South America, production fell from 24.1 million tonnes in 2005 to 22.2 million tonnes in 2006, reflecting cuts in Brazil, Colombia, Ecuador, Peru and Venezuela, which were the consequence of poor prices in 2005 and which depressed rice cultivation. The decline was particularly severe in Brazil and Venezuela, where production is estimated to have fallen by 12 and 20 percent, respectively, reflecting a shift in resources from rice to more remunerative crops. In Peru, the latest government estimates point to a 10 percent drop in production to 2.225 million tonnes. Meanwhile, excellent yields helped propel production in Argentina, Bolivia and Chile. Despite losses to floods in the first crop, paddy production in Guyana rose in 2006 to some 469 000 tonnes (up from 420 000 tonnes in 2005); much of this growth was the result of good yields in the second paddy crop.

Rest of the world

Production in the United States fell by 13 percent in 2006 to 8.788 million tonnes – the lowest level since 2000. This followed a 20 percent cut in rice area, the result of adverse weather conditions and rising costs. Drought problems caused production in the European Union to decline: overall output is currently estimated at 2.613 million tonnes (compared with 2.693 million in 2005). Increases of 19 and 8 percent were recorded in the Russian Federation and Ukraine, respectively. In Australia, the respite from lingering drought problems meant that production reached its highest level since 2002.

INTERNATIONAL TRADE IN RICE

A large part of the crops harvested in the Northern Hemisphere countries in 2006 are destined for trade in 2007, but the outlook for 2006 is not good and a global production decline is forecast. As a result, the world rice supply and demand situation is expected to be tight in 2007. Prospects for the 2007 crops being harvested in Southern Hemisphere countries are also poor, which means that the market situation may worsen during the course of the year.

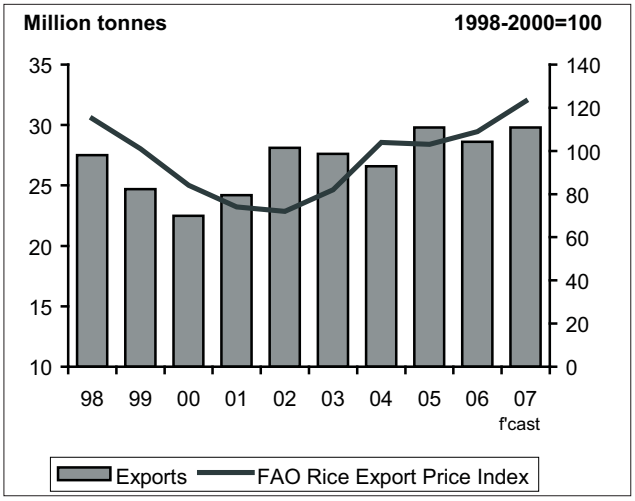
The most recent FAO forecast for global rice trade in 2007 stands at 29.8 million tonnes, about 900 000 tonnes more than previously anticipated and 1.2 million tonnes above the current 2006 trade estimate (Figure 4). The upward revision stems from the increased needs of importing countries facing production shortfalls, rather than from pressure to export, given the limited supplies held in exporting countries. If the current outlook is confirmed, trade in 2007 will virtually match the 2005 record.

Rice imports in 2007

Much of the 1.2-million-tonne increase in imports expected in 2007 is due to larger deliveries to some of the major traditional importing countries – in particular, Bangladesh, Brazil, Indonesia and the European Union – which will more than compensate for smaller shipments to the Islamic Republic of Iran, the Republic of Korea, Guinea, Nigeria, Senegal, Cuba and the Russian Federation.

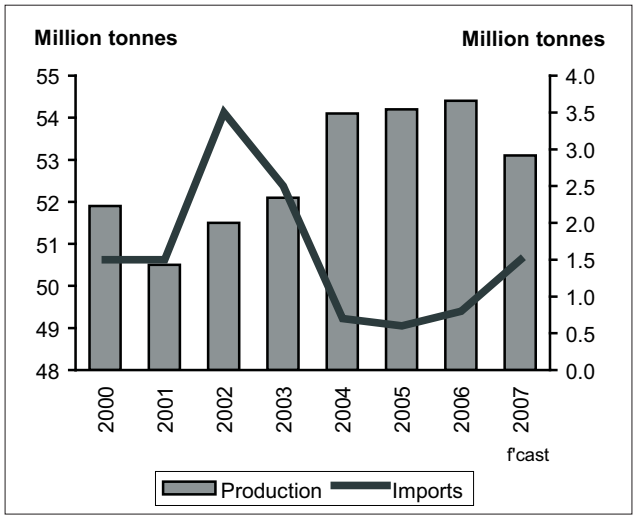
Asian countries are expected to be responsible for much of the increase in world imports in 2007. Imports in the region are expected to rise to 13.8 million tonnes (compared with 12.9 million tonnes in 2006), mostly reflecting larger purchases by Bangladesh, Indonesia, Nepal, the Philippines and Viet Nam, which are all facing

FIGURE 4
Global rice trade and price index



domestic supply constraints. In Bangladesh, pressure from rising retail prices induced the Government to suspend a 5 percent import duty in March 2007: imports may increase from 700 000 tonnes in 2006 to 1 million tonnes in 2007. Imports in Indonesia are forecast to almost double: from 800 000 tonnes in 2006 to 1.5 million tonnes in 2007 (Figure 5). Prevailing regulations state that rice can be imported only if rice stocks held by Bulog, the state food agency, fall below 1 million tonnes or if the retail market price of medium grade rice exceeds Rp 3 550 per kg (US$ 390 per tonne). Market prices in March were in the order of Rp 4 500–5 000 per kg, well above the price threshold. As a result, the country has engaged in both government-to-government and direct imports through Bulog. A reduced number of private firms have also been appointed to import 137 000 tonnes of rice by 31 March; as partners of Bulog, they are committed to distributing locally, subject to official price ceilings. To facilitate the process, the Government agreed to temporarily lower the import duty from Rp 450 to Rp 200 per kg until 31 May. This is the first time since the beginning of 2004 that the private sector has been allowed to engage in rice importation. Shipments to the Democratic People's Republic of Korea in 2007 are forecast to be in the order of 240 000 tonnes, slightly more than the 2006 estimate of 210 000 tonnes, but well below the volumes imported in the early 2000s, mostly as food aid, which ranged from 600 000 to 800 000 tonnes. The country was reported to be purchasing large amounts of rice from China over the first few months of the year. So, unless food aid deliveries resume, overall shipments will be limited to those it can afford to purchase on commercial terms.

FIGURE 5
Rice production and imports, Indonesia



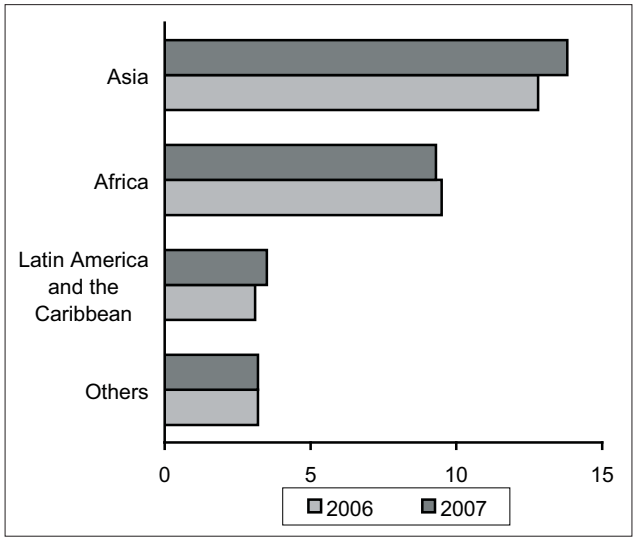
Despite steady gains in rice production in the Philippines, sustained population growth is boosting import demand. As a result, the state trading agency – the National Food Authority (NFA) – announced that the country would increase purchases of foreign rice in 2007 to some 1.65–1.8 million tonnes, 350 000 tonnes for import by private traders (delivered by 31 March) and 163 000 tonnes by producer groups (delivered by 31 May). The FAO forecast has therefore been raised to 1.7 million tonnes, which compares with an official estimate of 1.65 million tonnes for 2006. According to information released in February 2007, the country successfully concluded its negotiations to extend the right, expired in 2005, to retain quantitative restrictions on rice imports until 2012. The negotiation process involved nine WTO (World Trade Organization) countries (Argentina, Australia, Canada, China, Egypt, India, Pakistan, Thailand and the United States). Faced with a very tight rice balance, in January 2007 Viet Nam announced that it would waive tariffs on imports of milled and paddy rice from the Lao People's Democratic Republic until the end of the year (a measure in place for Cambodia since 2006). As a result, Viet Nam, the second largest rice exporter, is expected to import about 300 000 tonnes in the course of the year, up from an estimated 200 000 tonnes for 2006. By contrast, in the Islamic Republic of Iran, imports are forecast to fall to around 950 000 tonnes (150 000 tonnes less than in 2006). Part of the expected decline results from the elimination of special rights granted to people living on the border with Pakistan to import rice at reduced duty rates. Japan is expected to limit its purchases to the 770 000 tonnes in husked rice equivalent pledged under the WTO Agreement (700 000 tonnes on a milled basis). Following the 2005 agreement with interested WTO parties, the Republic of Korea is set to import 266 269 tonnes of milled rice in 2007 under a minimum import quota attracting 5 percent duty. Much of the rice should originate from China, Thailand and the United States, which have all been granted specific country quotas. Imports are unlikely to exceed the volume committed under the minimum import quota, and are therefore below the estimated 330 000 tonnes imported in 2006, when the Republic of Korea also had to provide part of the 2005 quota it had failed to fill. Although the country recently signed a free trade agreement with the United States, this specifically excluded rice.

Current forecasts of imports by African countries (Figure 6) indicate little change for the region as a whole, with overall shipments at around 9.3 million tonnes, down from the current estimate for 2006 of 9.4 million tonnes. While Egypt is predominantly an exporter, it did import about 100 000 tonnes of rice in 2006 (mostly from India) to keep in check rising domestic prices. The move was promoted by the authorities as a means to stabilize domestic supplies which had been drained by large exports; imports in 2007 are expected to reach a similar volume. Shipments to Côte d'Ivoire may also have to be raised to offset the expected production shortfall. By January 2007, Madagascar was already reported to have imported 100 000 tonnes to compensate for flood-related losses. Over the whole year, the country is expected to buy 250 000 tonnes of rice, 50 000 tonnes more than in 2006. By contrast, Nigeria may cut its purchases from 1.8 to 1.7 million tonnes, given the positive 2006 production outcome and restrictions on imports. Similarly, bumper crops for 2006 in Guinea, Mali and Senegal may result in smaller deliveries to those markets in 2007.

In principle, 2007 should be a transition year for West African countries. In January 2006, the heads of state of countries belonging to the Economic Community of West African States (ECOWAS)[2] agreed to implement a common external tariff (CET) as of January 2008, allowing for a one-year transition until 31 December 2007. The CET adopted by ECOWAS was that of the West African Economic and Monetary Union (WAEMU),[3] which had already been applied since 1 January 2000 by those ECOWAS countries belonging to WAEMU. Rice imports under the WAEMU CET attract a custom duty rate of 10 percent, a 1 percent statistical fee and a solidarity tax of 0.5 percent if imported from third countries.[4] Application of the WAEMU framework would imply a strong cut in protection for some ECOWAS countries, in particular Nigeria.[5] The impact would be less for the other countries where rice attracts already low rates of duty (the Gambia: 0%; Ghana: 20%; Guinea: 10%; and Sierra Leone: 15%).

Rice imports by countries in Latin America and the Caribbean are set to reach 3.5 million tonnes, about 400 000 tonnes more than in 2006. In Central America and the Caribbean, overall shipments in the subregion are expected to remain in the order of 2.3 million tonnes. Good crops in Cuba will probably result in reduced imports, while deliveries to Mexico may feel the effects of the requirement for all shipments from the United States to be certified to be free from genetically modified material. By contrast, imports by South American countries are forecast to rise from some 800 000 tonnes in 2006 to 1.2 million tonnes in 2007, as a result of larger purchases by Brazil, Chile, Colombia and Peru to make up for production shortfalls. In the case of Colombia, imports will also be facilitated by the strengthening of the local currency. Given that Colombia's most-favoured nation (MFN) tariff on rice is equal to 80 percent,[6] rice is mainly imported under preferential tariff rate quotas allocated to companies buying local rice through spot or futures auctions at the National Agricultural Commodity Exchange. A March 2005 decree granted a preferential 70 percent tariff rate import quota of 75 118 tonnes to non-Andean countries for 2006 and 2007, with over-quota

FIGURE 6
Rice imports by region, 2006 and 2007 (million tonnes, milled equivalent)



[2] Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, the Niger, Nigeria, Senegal, Sierra Leone and Togo.

[3] Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, the Niger, Senegal and Togo.

[4] WAEMU countries also levy a common value-added tax rate of 18 percent, payable at the port of entry plus a service fee of 6 or 12 percent, depending on the customs classification. Overall, tariffs on imported rice to WAEMU countries range from 35 to 45 percent. Provisions exist for safeguard action.

[5] Nigeria's total tariff approximates 110 percent (50 percent tariff, 50 percent additional levy of dutiable value and a 7 percent surcharge).

[6] Base duty of 15 percent on paddy rice, 20 percent on milled rice, and the rest a variable duty under a price band mechanism.

imports subject to the full 80 percent tariff. Following the signing of a side agreement between the Andean Community (Bolivia, Colombia, Ecuador, Peru and the Bolivarian Republic of Venezuela) and Mercosur, Colombia is to phase out over 15 years the rice base duties on imports from Mercosur countries. In 2007, they will be granted a 27 percent reduction on base duty rates, but will still be subject to variable duty of up to 60 percent. On the other hand, under the FTA signed with the United States, Colombia committed to granting the United States a tariff-rate quota of 79 000 tonnes, which is to increase by 4.5 percent a year. In addition, the 80 percent rice tariff is to be eliminated over 19 years, with a 6-year grace period. Peru also concluded its negotiations for an FTA with the United States. The agreement will result in the opening by Peru of a rice free trade tariff-rate quota of 72 000 tonnes, to be raised by 6 percent every year, until the complete abolition of import tariffs after 17 years. Rice imports from the United States will only attract the 25 percent base duty, but not the variable levy arising from the implementation of the price band mechanism. The parliaments of Colombia, Peru and the United States have not yet ratified the deal.

Imports by the 27 countries of the European Union are foreseen to reach 1.2 million tonnes, compared with 1.0 million tonnes in 2006. Part of the rise reflects the accession of Romania and Bulgaria (which have added some 80 000 tonnes to the EU-25 import estimate), but it also mirrors the prevailing high internal prices, which are likely to boost import demand, notwithstanding the elevation of tariffs on non-Basmati husked rice. This was triggered by large purchases in the first semester of the rice marketing year (1 Sept. – 28 Feb.), when the Union imported 352 809 tonnes of husked, non-Basmati rice. As this exceeded the threshold of 255 115 tonnes, the import duty charged from 1 March to 31 August 2007 is set at 65 euros per tonne, instead of the 42.5 euros per tonne applied from 1 September 2006 to 28 February 2007. However, because imports of milled and semi-milled rice were less than the 182 239 tonne ceiling, the duty applicable on their imports until the end of August remains at 145 euros per tonne. The narrowing of the duty differential between husked and milled rice will have negative effects on the EU's milling industry (Table 2).

USDA (United States Department of Agriculture) forecasts point to imports by the United States reaching a record 675 000 tonnes in 2007, compared with 633 000 tonnes in 2006 – a reflection of the poor outcome of the 2006 season and high domestic prices. In Australia, the government expects purchases to decline from 101 700 tonnes in 2006 to 96 600 tonnes in 2007 – this may not meet the country's needs, given the extremely low paddy output expected. Deliveries to the Russian Federation are likely to fall by over 20 percent to 250 000 tonnes, following the application of phytosanitary restrictions on rice from the major exporting countries and the introduction of a seasonal duty of 120 euros per tonne to be applied from 1 March to 31 May and from 1 October to 31 December, replacing the 70 euros per tonne introduced in April 2005.

Rice exports in 2007

Current production estimates and forecasts indicate that several of the major rice-exporting countries may face short supply situations in the coming months, which would impede them from responding fully to the expected

TABLE 2
European Union, applied tariffs on rice imports (*euros/tonne*)

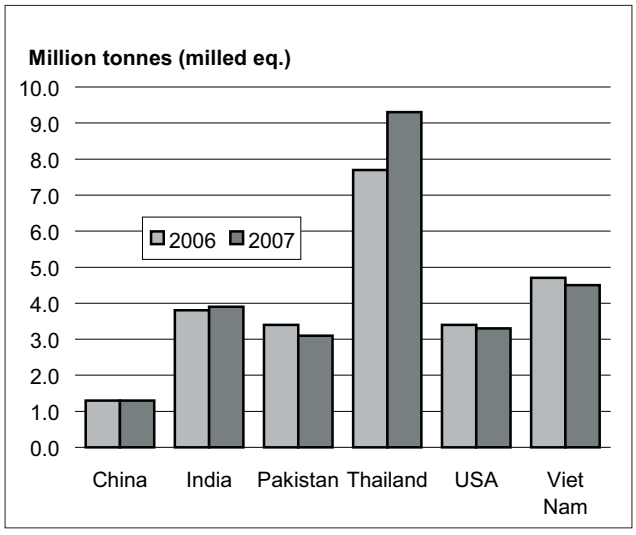
		2001/02	2002/03	2003/04	2004/05[a]		2005/06[a]		2006/07[a]	
					A	B	A	B	A	B
Paddy		211	211	211	211	211.0	211.0	211	211.0	211
Husked	japonica	257	262	228	65	42.5	42.5	65	42.5	65
	indica	264	264	233	65	42.5	42.5	65	42.5	65
Milled	japonica	416	416	416	175	175.0	145.0	145	145.0	145
	indica	416	416	416	175	175.0	145.0	145	145.0	145
Brokens		128	128	128	128	128.0	65.0	65	65.0	65

[a] Figures in column A refer to the period 1 Sept.–28 Feb. Figures in column B refer to the period 1 Mar.–31 Aug.
Source: EU Commission.

growth in import demand. The exception is Thailand – because of the high public stocks accumulated under the high support price policy conducted in 2005 and 2006 – in spite of the 2006 production shortfall. FAO forecasts (Figure 7) that exports by Thailand will increase from 7.7 million tonnes in 2006 to 9.3 million tonnes in 2007, more than 1 million tonnes of which are likely to consist of government-to-government transactions, in particular with Iraq, the Islamic Republic of Iran and Indonesia. The new FAO forecast for exports exceeds the government's March 2007 target of 8.5 million tonnes as well as FAO's previous forecast of 9.0 million tonnes.

The situation is likely to be different for India, where the anticipated 2006 production shortfall, if confirmed, would result in higher domestic prices; this would reduce the competitiveness of Indian rice on world markets and hinder the ability of the Food Corporation of India (FCI) to secure sufficient supplies domestically for its rice distribution programmes. The Government may be under increasing pressure to restrain exports. In March, it reacted to a hike in cereal prices by banning the trading in rice and wheat futures on its commodity exchanges. At present, however, FAO forecasts that the country will export 3.9 million tonnes – a modest increase on the 3.8 million tonnes estimated in 2006 and well below the 5.041 million tonnes officially delivered in 2005.

FIGURE 7
Rice exports by major exporters



Note: 2007 data are forecast.

Given the expected drop in 2006 production, exports by Pakistan could fall to 3.1 million tonnes from last year's 3.35 million tonnes. Part of the drop reflects quality problems resulting from heavy rainfall at harvest time and lack of proper storage. In this connection, the Government is becoming increasingly conscious of the importance of rice as a foreign exchange earner and is launching an awareness campaign to raise the quality of the grain produced, the lack of consistency of which has been a major problem for the sector in terms of gaining a foothold in the most remunerative markets, including the Basmati market. Quality problems have also led to difficulties in traditional markets, the consequence of which has been the mobilization of the Rice Exporters Association of Pakistan (REAP). In February 2007, for example, REAP signed a memorandum of understanding with the Kenya Bureau of Standards to issue rice export certificates based on international standards, in order to prevent the recurring of trade disputes. The memorandum commits REAP to monitor, certify and take responsibility for non-conformity of shipments with certificates. Since 2005, Kenya has been applying the Pre-shipment Verification of Conformity programme.

Exports by China (mainland) are expected to amount to some 1.3 million tonnes (i.e. 5 percent more than last year). The country is therefore predicted to remain a net rice exporter, selling lower quality rice to some Asian and African countries and higher quality rice to the Republic of Korea and Japan, while importing high quality rice, in particular, Hom Mali from Thailand.

In the FAO questionnaire, the Republic of Korea stated that it may suspend all exports of rice in 2007, given the tensions caused by the nuclear tests in the Democratic People's Republic of Korea, which led the Republic of Korea to suspend its food aid deliveries. Official forecasts then pointed to exports by the Republic of Korea falling from 90 000 tonnes in 2006 to nil in 2007. Although it was recently reported that trade between the two countries had resumed, the export forecast is to date unchanged (pending the release of new figures by the Government).

With the current good 2007 crop prospects, Sri Lanka may again have some surplus rice available for export in 2007 and may ship some 40 000 tonnes of rice in 2007, mostly to India (the same volume of exports as estimated in 2006).

In Viet Nam, harvesting of the winter/spring crop is currently under progress, which has eased the supply tightness prevailing since last year and led to the lifting,

in February 2007, of the export ban in place since November 2006. Despite that move, the official export target was set at only 4.5 million tonnes for 2007, which might be revised later during the season but which nevertheless is a decrease on the 4.749 million tonnes officially exported by the country in 2006. The decline also reflects the government decision to raise the minimum export price from US$ 290 to US$ 300 per tonne for 5 percent broken rice and from US$ 270 to US$ 280 per tonne for 25 percent broken rice. The minimum export price of all the other grades of rice was also raised by US$ 10 per tonne.

Outside of Asia, exports by Egypt are estimated to rise by 10 percent to 1.1 million tonnes in 2007, in response to buoyant import demand from Near East countries and limited competition from Australia and the United States, the other major suppliers of medium- and short-grain rice to world markets. Growing demand from Near East countries would compensate for the loss of the market in Romania, following the accession of the country to the EU on 1 January 2007.

The latest official export forecast by the United States – 3.30 million tonnes – is slightly lower than the 2006 level of 3.36 million tonnes. The decline would be consistent with the drop in production in 2006, while reflecting the difficulty of selling rice in certain markets requiring US rice consignments to be certified GM-free. Such difficulties could be further exacerbated by the finding in March of GM seeds (Bayer's Liberty Link 604) in long-grain rice planting material (non-biotech Clearfield 131 rice seeds).

Lower production levels in South America are also likely to depress exports in the region. In particular, Brazil is expected to cut sales abroad from an official 290 100 tonnes in 2006 to 200 000 tonnes this year. Likewise, shipments from Argentina, Ecuador and Uruguay may be constrained by the fall in production. By contrast, official forecasts point to a small increase in Guyana's exports, from 204 300 tonnes in 2006 to 213 000 tonnes in 2007. Given the bleak production outlook in Australia, FAO anticipates that shipments will fall from the official estimate of 479 300 tonnes in 2006 to 25 000 tonnes in 2007. This would be well below the current government forecast of 182 100 tonnes.

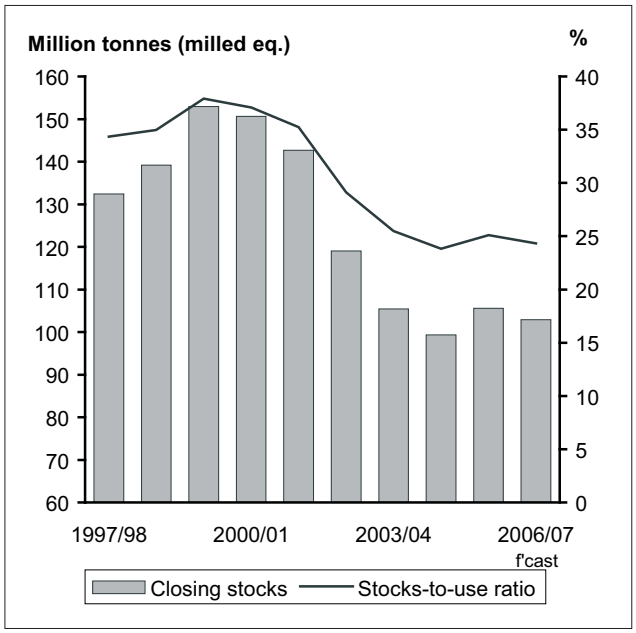
STOCKS

World rice inventories at the end of national crop seasons in 2007 were revised downwards from 105 to 103 million tonnes – a reflection of the worsening 2006 production outlook and a fall of almost 3 million tonnes compared with opening levels. While a significant reduction is expected in Thailand, the leading exporter, it is the importing countries that are expected to account for the bulk of the stock drawdown: closing inventories in Bangladesh, Brazil, Indonesia, the Islamic Republic of Iran, Nepal and Senegal, for example, are all expected to undergo cuts, while increases are forecast in the Philippines and Sri Lanka. Among exporting countries, Cambodia, Thailand, India and the United States may witness a drop, while stocks may increase in Pakistan, Myanmar and, especially, China. Little change is expected in the reserves held by Viet Nam.

The downward revision in the 2007 estimate of world rice carry-overs resulted in a lower rice stocks-to-utilization ratio of 24.3 (compared with the previous estimate of 24.7 and the 2006 figure of 25.1. The ratio is often used as a food security indicator because it measures the extent to which rice reserves can cover rice consumption in the following year (Figure 8).

With regard to stocks at the close of crop seasons ending in 2008, estimates are very preliminary. On the basis of provisional world production, trade and consumption forecasts, closing rice inventories are forecast to rise slightly above the 2007 level.

FIGURE 8
Global rice closing stocks and stocks-to-use ratio



INTERNATIONAL PRICES

Since December last year, export prices of rice from all origins have remained on an upward trend, as indicated by the FAO All Rice Price Index (1998-2000=100), which gained two points in January and February and 1 point in March, passing from 115 in December 2006 to 120 in March 2007. The strength concerned most quotations, with fragrant rice varieties and rice from Pakistan subject to particularly marked increases (Figure 9).

In Thailand, the announcement late last year that state-owned rice would be sold progressively through auctions failed to dampen the tendency for prices to rise, especially since a decision was taken to sell the supplies under government-to-government contracts whenever the prices offered at auctions did not reach the minimum targeted level. Buoyant demand for export and a strong currency contributed to keeping prices on the rise in February, while the opening of government purchases over the second paddy crop in March offered additional support and prevented prices from falling when fresh secondary crop supplies reached the market. Active purchases in India by the domestic procurement agencies under the Levy system made prices leap in December, but little growth was observed after February, as exporters waited for new supplies from the secondary rabi crop, which began to reach the market in March. As prices from other origins kept rising, India became the most competitive source: for example, milled rice with 25 percent brokens averaged US$ 260 per tonne in March, compared with US$ 264 in Pakistan, US$ 288 in Viet Nam and US$ 293 in Thailand (Figure 10). Export prices in Egypt, which supplies the medium- and short-grain rice markets, were stable in March following big rises in January and February. In Pakistan, on the other hand, limited availability of good quality rice led to major price increases, with the quotation of 25 percent brokens surging by 16 percent between December and March. Similarly, large price increases were recorded in Viet Nam, reflecting a combination of limited supplies and new sales, in particular to Indonesia and the Philippines. The pattern of prices in the United States in the first quarter deviated from that in the other major exporting countries: prices tended to fall below the December 2006 level, due to lack of new demand and because of the GM (genetically modified) issue, which led to the introduction of tighter certification requirements on United States rice imports in some major rice markets.

As April and May coincide with the harvesting period of the main 2007 crops in several countries in the Southern Hemisphere and of the secondary 2006 crops in the Northern Hemisphere, the tendency for prices to rise is likely to be tempered until June by the arrival of new supplies to the market. However, prices in the next few months are not expected to weaken much, as import demand is forecast to remain strong, while governments in Thailand, Viet Nam and now Cambodia are adamant about keeping them at remunerative levels. The general price outlook therefore points to continued gains in the coming months (Table 3).

FIGURE 9
FAO price indices for rice

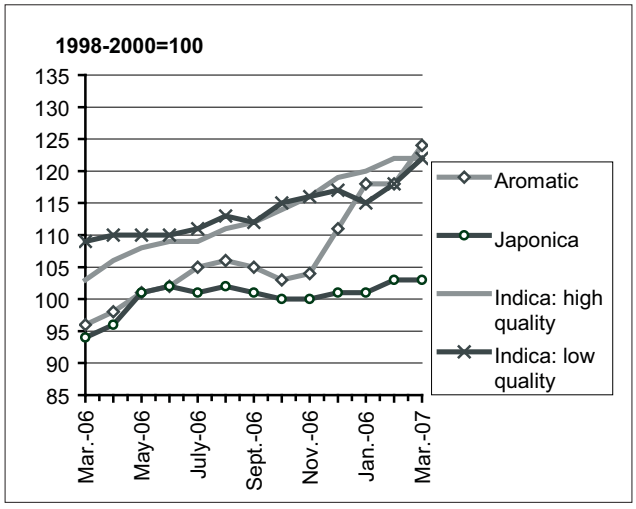


FIGURE 10
Export prices for rice

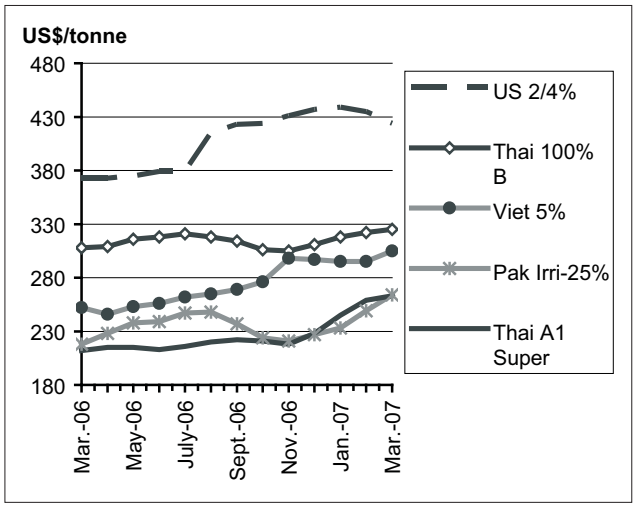


TABLE 3
FAO rice price indices

		All rice	Indica		Japonica	Aromatic
			High quality	Low quality		
		1998–2000 = 100				
2002		72	73	75	67	74
2003		82	79	81	82	91
2004		104	101	110	104	96
2005		103	104	115	92	94
2006		109	114	114	101	102
2006	Mar.	106	109	110	102	96
	Apr.	106	109	111	101	98
	May	108	111	113	102	101
	June	108	112	112	101	102
	July	109	114	115	100	105
	Aug.	110	116	116	100	106
	Sept.	111	119	117	101	105
	Oct.	111	120	115	101	103
	Nov.	113	122	118	103	104
	Dec.	115	122	122	103	111
2007	Jan.	117	123	125	104	118
	Feb	119	124	128	104	118
	Mar.	120	126	131	103	124
2006–07	Jan.–Mar.	105	107	110	100	95
2006–07	Jan.–Mar.	119	124	128	103	120

Note: The FAO rice price index is based on 16 rice export quotations. High quality = < 20% brokens; low quality = ≥ 20% brokens. The sub-index for aromatic rice follows movements in prices of Basmati and fragrant rice.
Source: FAO.

TABLE 4
Export prices for rice

		Thai White 100% B second grade	Thai Parboiled 100%	US Long grain 2.4%	Viet Nam 5%	Thai 25%	India 25%	Viet Nam 25%	Pakistan 25%	Thai A1 super[a]	US California medium grain[b]	Egypt Short grain grade 2.6% 178 Camolino	Pakistan Basmati ordinary	Thai Fragrant 100%
		(*US$/tonne f.o.b.*)												
2002		197	194	207	187	171	140	168	159	151	271	279	366	306
2003		201	196	284	183	176	163	167	175	151	370	291	357	449
2004		244	247	372	224	225	n.a.	212	230	207	493	317	468	443
2005		291	285	319	255	259	236	239	235	219	418	327	473	404
2006		311	300	394	266	269	247	249	230	217	512	353	516	470
2006	Mar.	308	290	373	252	265	238	240	218	212	491	358	500	436
	Apr.	309	290	373	246	267	243	231	228	215	485	361	500	442
	May	316	296	375	253	271	243	237	238	215	498	357	513	467
	June	318	299	379	256	272	243	233	239	213	507	373	525	479
	July	321	311	379	262	274	243	245	247	216	507	-[c]	525	511
	Aug.	318	311	415	265	274	243	250	248	220	507	-[c]	525	520
	Sept.	314	308	423	269	272	252	252	237	222	518	358	525	515
	Oct.	306	307	424	276	267	252	251	224	221	529	326	525	494
	Nov.	305	303	431	298	267	257	283	221	218	529	343	525	454
	Dec.	311	305	437	297	273	270	282	227	228	551	366	525	490
2007	Jan.	318	311	439	295	283	270	280	233	245	551	377	586	529
	Feb	322	315	435	295	291	270	280	249	259	551	392	600	523
	Mar.	325	318	424	305	293	260	288	264	263	551	392	615	537
2006–07	Jan.–Mar.	306	289	361	257	264	238	242	217	212	502	349	500	422
2006–07	Jan.–Mar.	322	315	433	298	289	267	283	249	256	551	387	600	530

[a] White broken rice. [b] Until Aug. 2005, US medium grain no. 2, 4% brokens; since Sept. 2005, no. 1, maximum 4% brokens; sacked, California mill. [c] Not quoted.
Source: Jackson Son & Co. (London) Ltd. and other public sources.

TABLE 5
Supply and utilization of rice in main exporting countries (national crop years)

	China[ab] (Oct.–Sept.)			India[b] (Oct.–Sept.)		
	2004/05	2005/06 (prelim.)	2006/07 (forecast)	2004/05	2005/06 (prelim.)	2006/07 (forecast)
	(*'000 tonnes*)			(*'000 tonnes*)		
Opening stocks	59 200 F	56 000 F	57 085 F	13 000 F	9 000 F	11 600 F
Production[d]	123 723 O	124 774 O	124 865 U	83 130 O	91 790 O	91 050 O
Imports	581 O	828 O	810 F	50 F	82 F	50 F
Total supply	183 504	181 602	182 760	96 180	100 872	102 700
Domestic use	126 806	123 255	123 055	82 139	85 472	87 600
Exports	698 U	1 262 U	1 325 F	5 041 O	3 800 F	3 900 F
Closing stocks	56 000 F	57 085 F	58 380 F	9 000 F	11 600 F	11 200 F

	Pakistan[a] (Nov.–Oct.)			Thailand[a] (Nov.–Oct.)		
	2004/05	2005/06 (prelim.)	2006/07 (forecast)	2004/05	2005/06 (prelim.)	2006/07 (forecast)
	(*'000 tonnes*)			(*'000 tonnes*)		
Opening stocks	650 F	150 F	200 F	3 200 F	3 800 F	5 000 F
Production[d]	5 025 O	5 547 O	5 400 O	18 892 O	20 053 O	19 484 O
Imports	1 F	1 F	1 F	8 O	1 F	1 F
Total supply	5 676	5 698	5 601	22 100	23 854	24 485
Domestic use	2 050	2 148	2 201	10 763	11 149	11 125
Exports	3 475 O	3 350 F	3 100 F	7 537 O	7 705 O	9 300 F
Closing stocks	150 F	200 F	300 F	3 800 F	5 000 F	4 060 F

	United States[c] (Aug.–July)			Viet Nam[a] (Nov.–Oct.)		
	2004/05	2005/06 (prelim.)	2006/07 (forecast)	2004/05	2005/06 (prelim.)	2006/07 (forecast)
	(*'000 tonnes*)			(*'000 tonnes*)		
Opening stocks	761 O	1 211 O	1 370 O	4 900 F	4 700 F	4 700 F
Production[d]	7 463 O	7 113 O	6 195 O	24 112 O	23 873 O	23 896 O
Imports	424 O	545 O	640 O	40 F	200 F	300 F
Total supply	8 648	8 869	8 205	29 052	28 773	28 896
Domestic use	3 943	3 809	3 923	19 152	19 324	19 696
Exports	3 494 O	3 690 O	3 262 O	5 200 O	4 749 O	4 500 F
Closing stocks	1 211 O	1 370 O	1 020 O	4 700 F	4 700 F	4 700 F

O: official figure.
U: unofficial figure.
F: FAO estimate/forecast.

[a] Rice trade data refer to the calendar year of the second year shown.
[b] Including Taiwan Province.
[c] Rice trade data refer to the August/July marketing season.
[d] Milled basis.

TABLE 6
World paddy production

	2005	2006 (estimated)	2007 (forecast)
	(*million tonnes*)		
World	**632.9**	**628.7**	**632.8**
Developing countries	607.0	604.0	609.6
Developed countries	25.8	24.7	23.2
Asia	**572.2**	**569.2**	**574.3**
Bangladesh	39.8	39.2	40.5
Cambodia	6.0	6.3	6.5
China	182.1	182.2	184.5
(of which Taiwan Prov.)	1.5	1.5	1.5
India	137.7	136.6	137.0
Indonesia	54.2	54.4	53.1
Iran (Islamic Rep. of)	3.3	3.3	3.5
Japan	11.3	10.7	10.4
Korea (Rep. of)	6.4	6.3	6.2
Myanmar	25.1	25.2	25.2
Pakistan	8.3	8.1	8.4
Philippines	15.1	15.4	15.8
Sri Lanka	3.2	3.3	3.2
Thailand	30.3	29.4	30.2
Viet Nam	35.8	35.8	36.0
Africa	**20.4**	**21.6**	**21.7**
North Africa	6.2	6.6	6.6
Egypt	6.1	6.5	6.6
Sub-Saharan Africa	14.2	15.0	15.1
Western Africa	8.8	9.3	9.6
Côte d'Ivoire	1.2	1.1	1.0
Guinea	1.3	1.3	1.4
Mali	0.9	1.0	1.0
Nigeria	3.6	3.9	4.3
Central Africa	0.4	0.4	0.4
Eastern Africa	1.4	1.6	1.6
Tanzania	1.0	1.2	1.2
Southern Africa	3.7	3.7	3.5
Madagascar	3.4	3.4	3.2
Mozambique	0.2	0.2	0.2
Central America	**2.3**	**2.4**	**2.5**
Cuba	0.4	0.5	0.5
Dominican Republic	0.6	0.7	0.7
Mexico	0.3	0.3	0.4
South America	**24.1**	**22.2**	**22.1**
Argentina	1.0	1.2	1.1
Brazil	13.2	11.6	11.3
Colombia	2.5	2.3	2.5
Peru	2.5	2.2	2.4
Uruguay	1.2	1.3	1.1
North America	**10.1**	**8.8**	**8.5**
United States	10.1	8.8	8.5
Europe	**3.4**	**3.4**	**3.5**
EU	2.7	2.6	2.8
Oceania	**0.3**	**1.1**	**0.1**
Australia	0.3	1.0	0.1

Note: Totals computed from unrounded data.

TABLE 7
World rice imports

	2005	2006 (estimated)	2007 (forecast[a])
	(*million tonnes, milled eq.*)		
World	**29.8**	**28.6**	**29.8**
Developing countries	25.5	24.0	25.2
Developed countries	4.3	4.5	4.6
Asia	**13.3**	**12.8**	**13.8**
Bangladesh	1.0	0.7	1.0
Cambodia	6.0	6.3	6.5
China	0.9	1.2	1.1
(of which Taiwan Prov.)	0.1	0.1	0.1
Indonesia	0.6	0.8	1.5
Iran (Islamic Rep. of)	1.2	1.1	1.0
Iraq	1.1	1.2	1.2
Japan	0.8	0.6	0.7
Malaysia	0.8	0.8	0.8
Philippines	1.8	1.7	1.7
Saudi Arabia	1.0	1.1	1.1
Sri Lanka	0.1	0.0	0.0
Africa	**10.5**	**9.5**	**9.3**
Côte d'Ivoire	0.9	0.9	0.9
Nigeria	2.3	1.8	1.7
Senegal	0.9	0.8	0.8
South Africa	0.8	0.7	0.7
Central America	**2.4**	**2.3**	**2.3**
Cuba	0.7	0.7	0.7
Mexico	0.5	0.6	0.5
South America	**0.8**	**0.8**	**1.2**
Brazil	0.5	0.6	0.9
Peru	0.1	0.0	0.1
North America	**0.7**	**1.0**	**1.0**
Canada	0.3	0.3	0.3
United States	0.4	0.6	0.7
Europe	**1.6**	**1.8**	**1.7**
EU	0.8	1.0	1.2
Russian Federation	0.4	0.3	0.3
Oceania	**0.4**	**0.4**	**0.4**

[a] Tentative.

TABLE 8
World rice exports

	2005	2006 (estimated)	2007 (forecast[a])
	(*million tonnes, milled eq.*)		
World	**29.8**	**28.6**	**29.8**
Developing countries	25.5	24.4	26.1
Developed countries	4.3	4.2	3.7
Asia	**22.9**	**21.6**	**23.5**
China	0.7	1.3	1.3
(of which Taiwan Prov.)	0.0	0.0	0.0
India	5.0	3.8	3.9
Myanmar	0.2	0.1	0.2
Pakistan	3.5	3.4	3.1
Thailand	7.5	7.7	9.3
Viet Nam	5.2	4.7	4.5
Africa	**1.1**	**1.0**	**1.1**
Egypt	1.1	1.0	1.1
South America	**1.7**	**2.0**	**1.7**
Argentina	0.3	0.5	0.5
Guyana	0.2	0.2	0.2
Uruguay	0.7	0.8	0.7
North America	**3.9**	**3.4**	**3.3**
United States	3.9	3.4	3.3
Europe	**0.2**	**0.2**	**0.2**
EU	0.2	0.2	0.2
Oceania	**0.1**	**0.5**	**0.0**
Australia	0.1	0.5	0.0

[a] Tentative.

Examen de la situation du marché du riz en 2007[1]

Les estimations de la production mondiale de paddy en 2006 ont été révisées à la baisse de 2 millions de tonnes depuis décembre 2006, le chiffre actuel étant de 629 millions de tonnes. À ce niveau, la campagne 2006 de paddy qui vient de se terminer se solderait par un déficit de 4 millions de tonnes par rapport à la campagne record de 2005. Une bonne partie de cette diminution vient sans doute de la baisse des récoltes qu'ont provoquée en Asie une mousson irrégulière et des attaques d'insectes. La production est également en baisse dans la région Amérique Latine et Caraïbes, mais reste en progression en Afrique pour la cinquième année consécutive. Le reste du monde a connu des résultats variables.

En même temps que les prévisions de production fléchissaient, les prévisions FAO pour le commerce mondial de riz montaient, atteignant à ce jour à un niveau de 29,8 millions de tonnes, soit une hausse de 900 000 tonnes. Cela représenterait une amélioration de 1,2 million de tonnes par rapport à 2006, égalant presque le record commercial de 2005. La hausse des volumes échangés attendue pour 2007 reflète l'accroissement des besoins d'approvisionnement des pays importateurs, face à des déficits de production. Du point de vue des pays exportateurs, il y a moins de pression pour une expansion des volumes mis sur le marché international, en raison des contraintes dont peut également avoir à souffrir l'approvisionnement des principaux pays exportateurs.

L'accroissement des importations mondiales attendu pour 2007 serait largement la conséquence des

[1] Les informations reprises par ce document datent du 30 mars 2007.

livraisons plus importantes en direction des pays d'Asie, plus particulièrement le Bangladesh, l'Indonésie, le Népal, les Philippines et le Viet Nam. Les pays africains, en revanche, grâce à leur bonne campagne 2006 de paddy, seront peut-être en mesure de réduire leurs importations. Les importations des pays de la région Amérique Latine et Caraïbes devraient monter, l'accroissement des importations brésiliennes, colombiennes et péruviennes l'emportant sur la baisse des volumes destinés au Mexique et à Cuba. Dans le reste du monde, les États-Unis et l'Union européenne devraient importer davantage en 2007, tandis que la Fédération de Russie, ayant relevé ses barrières douanières, devrait voir décliner ses propres achats de riz.

Parmi les exportateurs, seule la Thaïlande et le Cambodge semblent capables de réagir à l'accroissement de la demande d'importations par une progression substantielle de leurs exportations. Des prix mondiaux plus rémunérateurs pourraient également entraîner une progression, relativement limitée, des exportations indiennes et égyptiennes, mais le reste des principaux producteurs – y compris l'Australie, le Pakistan, les États-Unis et le Viet Nam – devraient, pour la plupart, restreindre leurs exportations.

Les stocks mondiaux de riz à la fin des campagnes nationales de production de 2007 ont été révisés à la baisse, vers un chiffre de 103 millions de tonnes, par rapport à une estimation initiale de 105 millions de tonnes – ce qui résulte essentiellement des moins bonnes perspectives de production en 2006. À ce niveau, les stocks mondiaux de riz connaîtraient une chute de près de 3 millions de tonnes par rapport au niveau précédent, entraînant une détérioration du ratio « stock sur consommation » qui passerait de 25,1 pour cent en 2006 à 24,3 pour cent en 2007.

Depuis décembre 2006, les prix à l'exportation de toutes les origines ont connu une tendance régulière à la hausse, illustrée par l'Indice FAO des prix du riz (base 100 = 1998-2000), qui est passé de 115 en décembre 2006 à 120 en mars 2007. Cette évolution positive affecte la plupart des origines, en particulier les variétés parfumées de riz et le riz pakistanais.

Du fait qu'avril et mai coïncident avec la récolte des principales campagnes 2007 de l'hémisphère Sud et celle des campagnes secondaires 2006 de l'hémisphère Nord, la tendance à la hausse des prix pourrait s'inverser jusqu'en juin suite à la mise sur le marché de ces nouvelles productions. Cependant, une baisse substantielle des prix est improbable, en raison de la demande d'importation qui devrait demeurer importante, tandis que les Gouvernements de Thaïlande, du Viet Nam et plus récemment du Cambodge restent intransigeants sur le principe d'un niveau rémunérateur des prix. On peut donc s'attendre de façon générale à une hausse soutenue au cours des mois à venir.

Examen de la situación mundial del arroz en 2007[1]

Las estimaciones de la producción mundial de arroz en 2006 se han reducido en 2 millones de toneladas desde diciembre de 2006, situándose ahora en 629 millones de toneladas. Con este volumen, la campaña arrocera de 2006 que acaba de concluirse arrojaría un resultado inferior en 4 millones de toneladas al nivel sin precedentes de 2005. Es probable que tal disminución se deba en gran parte a la obtención de cosechas menores en Asia a causa del comportamiento irregular de los monzones y los ataques de insectos. La producción también descendió en 2006 en América Latina y el Caribe, pero en África creció por quinto año consecutivo. En el resto del mundo, los resultados fueron mixtos.

Al reducirse las perspectivas de la producción ha crecido el volumen de comercio mundial pronosticado por la FAO para 2007, el cual se sitúa actualmente en 29,8 toneladas habiendo sufrido un incremento de 900 000 toneladas. Esto representaría un aumento de 1,2 millones de toneladas con respecto a 2006, con el que casi se alcanzaría el volumen récord de intercambio de 2005. El incremento del comercio previsto para 2007 es consecuencia de las mayores necesidades de suministros de los países importadores, aquejados por déficit productivos. En los países

[1] La información contenida en este documento es la disponible al 30 de marzo de 2007.

exportadores existe menos presión para expandir el comercio, puesto que también dichos países pueden enfrentarse con limitaciones de oferta suministro.

El incremento previsto de las importaciones mundiales en 2007 sería consecuencia en gran parte de las mayores entregas a los países asiáticos, en particular Bangladesh, Filipinas, Indonesia, Nepal y Viet Nam. Por otra parte, los países africanos podrían estar en condiciones de reducir sus importaciones gracias a sus buenas campañas arroceras de 2006. Las importaciones de los países de América Latina y el Caribe están destinadas a crecer por el aumento de las compras del Brasil, Colombia y Perú, que superan los envíos, más reducidos, de México y Cuba. En el resto del mundo, Estados Unidos de América y la Unión Europea están preparados para incrementar sus importaciones en 2007, mientras que un aumento de la protección en las fronteras podría reducir las compras de la Federación de Rusia. Entre los exportadores, sólo Tailandia y Colombia parecen estar en condiciones de responder a la demanda creciente incrementando considerablemente sus entregas. Los precios mundiales atractivos también podrían determinar un ligero incremento de las exportaciones de la India y Egipto, pero se prevé que la mayor parte de los otros grandes proveedores – incluidos Australia, Estados Unidos, Pakistán y Viet Nam – reducirán sus exportaciones. Al finalizar las campañas arroceras nacionales en 2007 el nivel de las existencias mundiales de arroz se revisó a la baja, calculándose en 103 millones de toneladas frente a la estimación anterior de 105 millones. Esto se debió principalmente al empeoramiento de las perspectivas de la producción en 2006. En ese nivel, las existencias mundiales de arroz habrían descendido en casi 3 millones de toneladas con respecto a los niveles de apertura con el consiguiente deterioro de la relación entre reservas y utilización, que descendió de 25,1 % en 2006 a 24,3 % en 2007.

Desde diciembre de 2006 los precios de las exportaciones de arroz de todos los orígenes registran una tendencia constante al alza, como indica el índice de precios de la FAO para todos los tipos de arroz (1998–2000=100) que ascendió de 115 en diciembre de 2006 a 120 en marzo de 2007. Esta solidez refleja la mayor parte de las cotizaciones, en particular las de arroz aromático y las del arroz del Pakistán.

Puesto que abril y mayo coinciden con la cosecha de los cultivos principales de 2007 en el hemisferio sur y con la de los cultivos secundarios de 2006 en el hemisferio norte, la tendencia al alza de los precios puede disminuir hacia junio con la llegada de los nuevos suministros al mercado. Sin embargo, es improbable que los precios se debiliten mucho considerando que se mantiene la fuerte demanda de importación, mientras que los gobiernos de Tailandia, Viet Nam, y ahora también el de Camboya, se muestran inflexibles en cuanto al mantenimiento de los niveles lucrativos. Por consiguiente, la perspectiva general con respecto a los precios apunta al mantenimiento de las ganancias en los próximos meses.

Performance and challenges of global rice production during 2000–10

N.V. Nguyen
Executive Secretary, International Rice Commission, FAO, Rome, Italy

INTRODUCTION

In 2004, more than 3 billion people depended on rice as a staple food, and given the steady population growth this number will increase in the near future. Following a gradual decline, global rice production has been increasing since 2002, but in terms of food security, further effort and support is required from all stakeholders. Global climate change may have a large impact on rice production in the second half of the first decade. Although international rice prices improved considerably during the first half of the decade, rice production in the remaining years could be significantly affected by the competition for land and water resources for the production of crops for feed and for fuel. Sustainable rice production in the near future, therefore, will depend greatly on competitiveness. Fortunately, technological options are available for increasing the competitiveness of rice production. This paper provides a summary review of: the performance of global rice production in the first half of the decade; and the rice requirement for food security in the second half. It then discusses the potential challenges that rice could face in the near future and finally the technological options for increasing competitiveness for sustainable production.

RICE PRODUCTION IN THE FIRST DECADE OF THE TWENTY-FIRST CENTURY

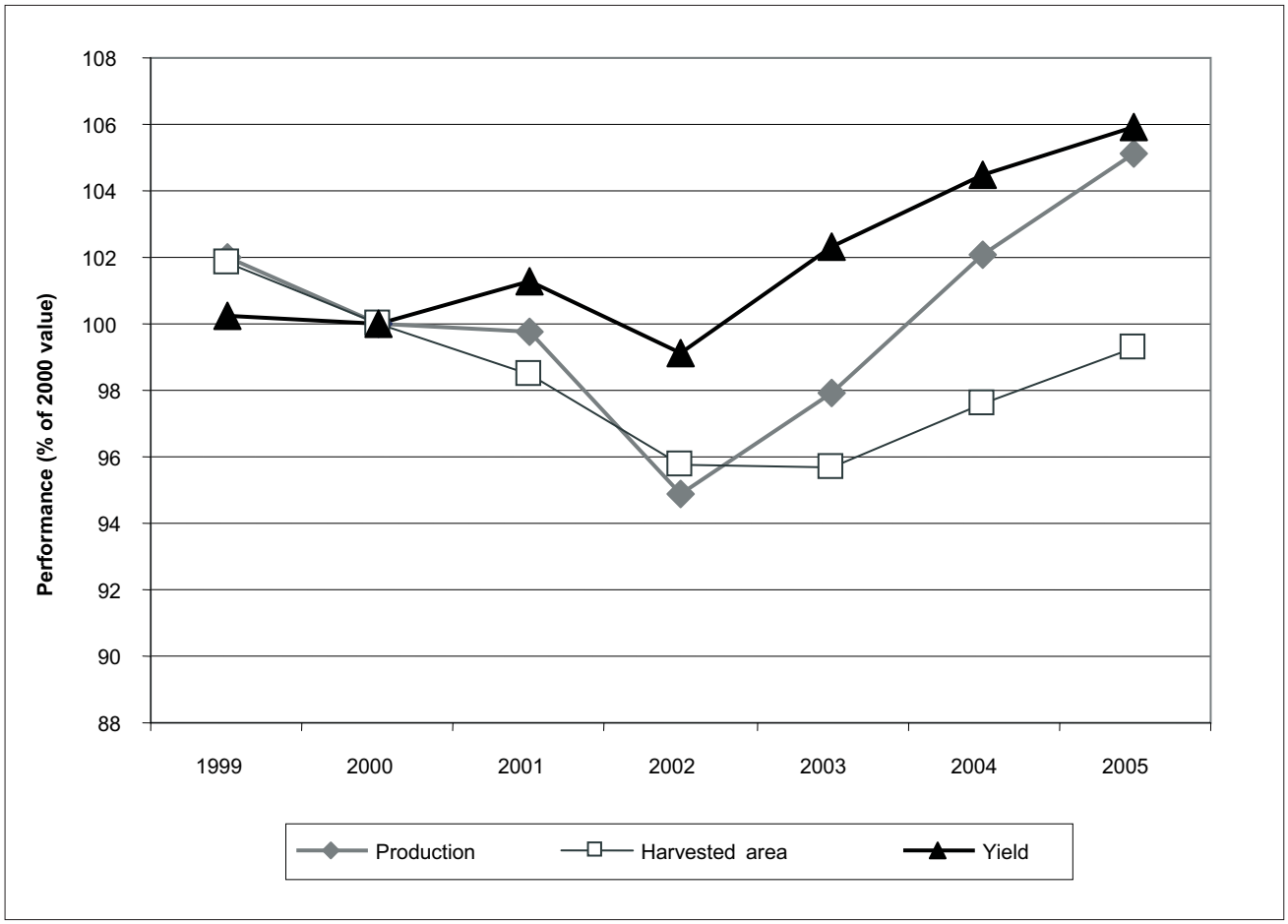
During the first half of the decade, global rice output decreased sharply between 2000 and 2002 and then rebounded strongly back. In spite of the strong recovery in global production, the per capita rice output in 2005 was still substantially less than in 1999. As the population continues to grow, the food security of rice-dependent populations will be at risk unless there is an effort to support an increase in global rice production in the second half of the first decade of the twenty-first century.

Rice production in the first half of the decade, 2000–05

After reaching 610.6 million tonnes in 1999, global rice output began a declining trend. The 31st Session of the FAO Conference met in November 2001 and, noting the degraded situation of global rice production, adopted Resolution 2/2001 recommending the United Nations General Assembly (UNGA) to declare an International Year of Rice. Global rice output continued to decline in 2002 (Figure 1). In December 2002, UNGA declared 2004 the International Year of Rice in order to raise global awareness of the vital role that rice plays in the worldwide effort to reduce hunger and poverty (Millennium Development Goal 1). World rice output began to recover in 2003 and reached 610.9 million tonnes in 2004 and 629.3 million tonnes in 2005 (FAOSTAT). Global rice output since 1999 has been sustained mainly by farmers' efforts to increase productivity or yield. World rice yield in 2005 was 4.11 tonnes/ha (about 6 percent higher than the 1999 figure of 3.88 tonnes/ha), while the global rice harvest area during the period from 2000 to 2005 remained below 156.7 million ha (the level reached in 1999).

During 2000–05, twenty of the 113 rice-producing countries produced about 95 percent of the world's rice: 15 from Asia (Bangladesh, Cambodia, China, India, Indonesia, the Islamic Republic of Iran, Japan, the Republic of Korea, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Viet Nam), 3 from Africa (Egypt, Madagascar and Nigeria) and 2 from America (Brazil and the United States). Rice production in the Islamic Republic of Iran, the Philippines, the United States and Viet Nam increased steadily and substantially during 2000–05. The increased production in the Islamic Republic of Iran, the Philippines and the United States was more due to increased rice yield than to increased harvested area; in Viet Nam, on the other hand, it was entirely

FIGURE 1
Trends of global rice production, harvested area, and yield, 1999 to 2005 (2000 value = 100%)



due to yield increase, as the harvested area steadily decreased. In Madagascar, Myanmar and Thailand, the production increase between 2000 and 2002 was modest, becoming substantial after 2002, mainly as a result of yield increase (Table 1, Group 1).

The patterns of change in rice production in Bangladesh, Indonesia, Sri Lanka, Cambodia and Pakistan were similar: stagnated production from 2000 to 2002, followed by a substantial increase between 2002 and 2005. India, Nigeria and Brazil, on the other hand, saw production decrease from 2000 to 2002, followed by a substantial increase. The change in rice production in India was exceptional, with a rapid decrease of about 20 million tonnes from 2000 to 2002, followed by a rapid increase of about 30 million tonnes from 2002 to 2005. The substantial increase in rice production in India and Brazil during 2002–05 was due to increases in both harvested area and yield, while in Nigeria it was due mainly to the expansion of the harvested area (Table 1, Group 2).

Rice production in Egypt and Nepal remained more or less unchanged between 2000 and 2005. In Nepal, both yield and harvested area were constant, while in Egypt yield increased and harvested area decreased during this period. The rice outputs of China, Japan and the Republic of Korea in 2005 were less than in 2000. In China and Japan, rice production showed a sign of recovery after 2002, but in the Republic of Korea rice production steadily decreased during 2000–05 (Table 1, Group 3).

Rice requirement for food security in the second half of the decade, 2006–10

The world population in 2004 was 6.37 billion (6.4 percent higher than the 1999 figure of 5.99 billion) (FAOSTAT). The world rice output in 2005 was 3 percent

TABLE 1
Rice production, harvested area and yield in the top 20 rice-producing countries, 2000, 2002 and 2005

	2000			2002			2005		
	Production (*million tonnes*)	Harvested area (*million ha*)	Yield (*tonnes/ha*)	Production (*million tonnes*)	Harvested area (*million ha*)	Yield (*tonnes/ha*)	Production (*million tonnes*)	Harvested area (*million ha*)	Yield (*tonnes/ha*)
Group 1: *Rice production increased steadily between 2000 and 2005*									
Iran (Islamic Republic of)	1.9	0.53	3.68	2.8	0.61	4.72	3.5	0.63	5.55
Philippines	12.3	4.03	3.06	13.2	4.04	3.27	14.6	4.20	3.47
Viet Nam	32.5	7.66	4.24	34.4	7.50	4.59	35.7	7.32	4.88
United States of America	8.6	1.23	7.03	9.5	1.29	7.37	10.1	1.36	7.43
Madagascar	2.4	1.21	2.05	2.6	1.21	2.14	3.4	1.25	2.72
Myanmar	21.3	6.30	3.38	21.8	6.38	3.41	25.3	7.00	3.61
Thailand	25.8	9.89	2.61	26.0	9.98	2.60	29.2	9.97	2.92
Group 2: *Rice production either stagnant or decreased between 2000 and 2002, then increased rapidly between 2002 and 2005*									
Bangladesh	37.6	10.80	3.48	37.5	10.77	3.49	39.7	10.52	3.78
Indonesia	51.8	11.79	4.40	51.4	11.52	4.46	53.9	11.80	4.57
Sri Lanka	2.8	0.83	3.43	2.8	0.82	3.48	3.2	0.91	3.54
Cambodia	4.0	1.90	2.11	3.8	1.99	1.91	5.9	2.41	2.47
Pakistan	7.2	2.37	3.03	6.7	2.22	3.01	8.3	2.62	3.17
India	127.4	44.71	2.84	107.6	41.20	2.61	136.5	43.40	3.14
Nigeria	3.2	2.20	1.50	2.9	2.18	1.34	3.5	2.49	1.43
Brazil	11.0	3.65	3.02	10.4	3.14	3.32	13.1	3.91	3.37
Group 3: *Rice production either unchanged or decreased between 2000 and 2005*									
Nepal	4.2	1.56	2.70	4.1	1.54	2.67	4.2	1.55	2.71
Egypt	6.0	0.66	9.10	6.1	0.65	9.39	6.1	0.61	9.98
China	189.8	30.30	6.26	176.3	28.50	6.18	182.0	29.08	6.25
Japan	11.8	1.77	6.70	9.7	1.68	6.58	11.3	1.70	6.64
Republic of Korea	7.1	1.07	6.71	6.6	1.05	6.34	6.4	0.98	6.56

Source: FAOSTAT.

higher than in 1999. Consequently, the per capita rice output in 2005 was less than in 1999. Between 1999 and 2004, the world population increased by 385 million; at this rate, it is likely to reach 6.7 billion in 2010. In order to maintain the 2005 level of rice output (97.4 kg/person), global rice output needs to reach about 652.5 million tonnes in 2010 (i.e. 23.2 million tonnes more than in 2005 – scenario I). Similarly, an output of 682.0 million tonnes in 2010 (52.7 million tonnes more than in 2005 – scenario II) will be required to recover the per capita rice output (101.8 kg/person) obtained in 1999 (Table 2). In order to produce the extra quantity of rice, global rice production requires more resources (especially land and water) and support to raise productivity. However, the current increase in rice prices in the global markets may provide an incentive to farmers to grow more rice during the second half of the first decade of the century.

TABLE 2
Global population and global rice output and per capita rice output in the first decade of the twenty-first century

Year	Global population (*billion*)	Global rice output (*million tonnes*)	Per capita rice output (*kg/person*)	
1999	5.99	610.6	101.8	
2000	6.07	598.4	98.5	
2001	6.14	597.3	97.1	
2002	6.22	568.3	91.2	
2003	6.30	585.7	92.9	
2004	6.37	610.9	95.7	
2005	6.45[a]	629.3	97.4[a]	
2010	6.7[a]	652.5	97.4	= 2005 value
2010	6.7[a]	682.0[a]	101.8	= 1999 value

[a] Estimated values.
Source: FAOSTAT.

MAIN CHALLENGES OF RICE PRODUCTION IN THE NEAR FUTURE

During the second half of the twentieth century, dams were built to divert the flow of the river or to store surface water and then channel it onto rice fields. In the late 1960s, farmers in a number of countries turned to underground sources and millions of irrigation wells were drilled to provide water for rice production. In tropical climate areas, especially in Asia, the availability of irrigation together with early-maturing and photoperiod-insensitive rice varieties have allowed farmers to grow two to three rice crops on the same pieces of land in the same year (Tran and Nguyen, 2001) and this had led to the substantial increase in the global rice harvested area from about 125 million ha in 1965 to about 156.7 million ha in 1999 (FAOSTAT). The land and water resources for rice production in the near future may be significantly affected by the global climate change. Also, the recent developments indicate that the land and water resources for rice could be under intense competition from the production of crops for feed and fuel. The recent evolution of rice prices, however, highlights the competitiveness of the crop and the potential for farmers to allocate more land and water resources to rice production in the near future.

Global climate change

The main characteristics of global climate change are: increase in temperature, variation in rainfall and its distribution, and rising sea level. About 40 percent of the world rice area is classified as rainfed lowland and upland, while about 3.5 million ha of riceland are still being classified as deep-water or flood-prone. The variability in rainfall and its distribution under global climate change would cause more droughts and flooding in these rice ecologies. In 1992, it was reported that the core agricultural zone in Zimbabwe would be reduced by 67 percent with a 2 °C temperature increase (Downing, 1992). Recently, Darwin *et al*. (2005) estimated that the amount of land classified as "land class 6" (the primary land class for rice, tropical maize, sugar cane and rubber in tropical areas) would decline by 18.4 to 51 percent in the next century as a result of global warming.

Large areas in the low-lying deltas of the Ganges, the Mekong, the Mississippi, the Nile, the Yangtze, the Yellow and other major river systems with important rice-growing regions, have been affected by tidal waves. For example, it was reported that there were about 650 000 ha of saline soils along the coastal belt in the Mekong River Delta and 350 000 ha in the Red River Delta of Viet Nam (FAO, 1988). Most rice varieties are severely injured in submerged soil culture at an electrical conductivity (ECe) of 8–10 mmho/cm at 25 °C (Ponnamperuma and Bandyopadhya, 1980). Rising seas would result in an expansion of the area affected by tidal waves. Enormous areas of coastal Florida, much of Louisiana, the Nile Delta and Bangladesh would become uninhabitable once seas rise by as much as 88 cm (Kluger and Lemonick, 2001).

Competition for land water resources by the production of crops for feed

Humans consume a variety of foods to provide energy, protein, vitamins and other essential elements for growth, development and maintenance of their bodies, and societies have relied mainly on agricultural production systems to provide these foods. The foods that provide energy are called staple foods, and rice was the staple of more than 3 billion people in 2004. Rice is rich in energy-producing materials, but proteins and other elements are often limited; rice must therefore be supplemented with animal proteins.

The rapid increase in demand for animal proteins during the second half of the twentieth century, however, has outgrown the sustainable yield of the natural ocean and rangeland systems. Therefore, the production of beef and milk, chicken and eggs and pork increasingly takes place in confined feedlots, while fish and shrimps are produced in inland ponds. The animal protein that is produced in these so-called "confined systems" has been supported by feed, which is produced from grain crops such as maize and soybean and to a lesser extent wheat and other crops.

It is estimated that about 7 kg of grain are needed to produce 1 kg of additional weight in beef production, 3.5 kg in pork, 2 kg in poultry, and 1 to 2 kg in fish (Brown, 2005). The world demand for animal protein is expected to increase in the second half of the first decade of the twenty-first century. Consequently, more land and water resources will be used for the production of maize, soybean and other crops for feed production.

Competition for land water resources by the production of crops for fuel

The world is increasingly looking to crops as a source of renewable fuel or biofuels. In Brazil, sugar cane has been a popular biofuel crop, while in the United States maize has recently become the top biofuel crop with 550 to

750 million bushels of maize being used for ethanol production per year (Lyddon, 2006; Donley, 2007). The quantity of maize used for ethanol production in the United States is projected to increase in the near future. Rapeseed and maize have also been grown for biofuel production in Canada. In China, fuel ethanol production increased from 30 000 tonnes in 2002 to 1.02 million tonnes in 2005 (Anon., 2007). The quantity of maize used for production of ethanol and other industrial products in China in 2006 was about 23 million tonnes or an increase of about 84 percent on 2001.

In the European Union, the "Biofuels Directive" issued in 2003 requires member states to achieve an inclusion rate of 2 percent renewable fuel by 2005 and 5.75 percent by 2010 (Lyddon, 2007). Today, canola or rapeseed oil are the dominant materials used in the production of biodiesel in the European Union where about 3.8 million tonnes of biodiesel were produced in 2005. It is estimated that to achieve the 5.75 percent target in 2010, the European Union would need around 11 million tonnes of biodiesel. Consequently, more land and water resources will be used for the production of biofuel crops, if no alternative source is found.

Evolution of rice prices in the first decade of the twenty-first century

Although rice is the staple food crop of the majority of rice farmers, rice production is an economic activity. The net return or income from rice production (compared to the production of crops for feed and fuel) affects a farmer's decision on whether or not to continue rice production or to shift to the production of feed and/or fuel crops. The income from rice production is defined as follows:

Income = yield × unit price – (production cost)

The export prices for all types of rice have increased steadily since 2002 (see Table 4, p. 11). Consequently, the income from rice production has also improved, especially when the production costs were either kept unchanged or changed minimally. The FAO Rice Price Indices showed that the prices of all types of rice in 2006 were about 9 percent higher than in the 1998–2000 period. A continuation of this positive trend of rice prices would encourage farmers to allocate more land and water resources for rice production and to apply good production practices that minimize production costs.

TECHNOLOGICAL OPTIONS FOR INCREASING THE COMPETITIVENESS OF RICE PRODUCTION

In the near future, sustainable rice production depends greatly on its competitiveness. Generally, the increase in rice yield and higher rice prices have enhanced the economic competitiveness of rice production during the first half of the first decade of the twenty-first century. Below are a number of technological options for further increasing rice yield and economic competitiveness in the second half of the first decade of the twenty-first century as well as for improving the environmental protection and conservation aspects of rice production.

Increasing yield to increase the competitiveness of rice production

The development and adoption of high-yielding and hybrid rice varieties has greatly contributed to the increase in global rice yield from about 2.032 tonnes/ha in 1965 to 4.017 tonnes/ha in 2005. Much of the yield increases, however, occurred in irrigated ecologies. A recent review of rice breeding indicated that, at present, NERICA (New Rice for Africa) and hybrid varieties are still viable for further increasing rice yield in the near future (Nguyen, 2006). The review also revealed that promising results have been obtained by the efforts to create a new generation of rice varieties.

The yield of existing rice varieties could be substantially increased with the integrated application of good management practices (Hill *et al*., 2004; Lacy and Steel, 2004; Abdulrachman, Las and Yuliardi, 2005; Nguyen and Ferrero, 2005; Kueneman, 2006). Yields of the existing irrigated rice varieties in several developing countries were increased by as much as 4 tonnes/ha on experimental farms (Kueneman, 2006) and more than 1 tonne/ha in large-scale production (Anon., 2006) with integrated application of good management practices, which also enhanced the efficiency of applied inputs, thus reducing production costs (Pham, Trinh and Tran, 2005), and substantially decreased the quantity of applied water in rice production (Lacy and Steel, 2004).

The yield and productivity of rainfed lowland rice systems could be increased with on-farm water-harvesting facilities. Total rainfall during the monsoon season in most tropical areas is more than adequate to guarantee the water supply of a rice crop with a growth duration of up to 5 months. However, due to variation in rainfall distribution, much of the rainwater is lost. Traditionally farmers in Southeast Asia built on-farm water-harvesting facilities,

such as ponds, and alternated deep furrows and raised beds to improve water supply and enhance productivity in rainfed lowland ecologies. These systems offered one or a combination of the following possible advantages:

- Provision of supplemental irrigation with water from ponds or deep furrows to minimize the negative effects of drought.
- Planting rice in raised beds to minimize the negative effects of flood.
- Using available water from the ponds or deep furrows, scheduling planting so that the crop can benefit from higher solar radiation following the monsoon season to produce higher yield.
- Cultivation of fish and other aquatic animals in ponds and deep furrows.

Biomass utilization to increase the competitiveness of rice production

Rice crops produce grains and straw at harvest. Varieties with a grain/straw ratio of 1 produce 1 tonne of straw for every tonne of grain. Milling 1 tonne of grain produces an average of 70–100 kg of broken rice, 50–70 kg of rice bran, 190–200 kg of rice husks, and about 640–690 kg of milled rice (or whole rice). Most milled rice is used as food, while broken rice and rice bran have been used as feed for animals and fish. Rice bran is also used for the production of cooking oil, cosmetic materials and other products. However, in many countries straw and husks have not been widely used, although there are technological options for converting them into value-added products. In southern Asian countries (e.g. Bangladesh, India, Nepal and Pakistan), rice straw has been used as feed for cattle and traded for cash in markets (FAO, 1990). The utilization of rice straw and other biomass for milk production is extremely successful in India (Brown, 2005). The major constraints in the utilization of rice straw in many places are its collection, transport and conservation. Bale pressers have been used for the rapid collection of straw and crop residues in a number of countries.

Burning 1 kg of rice husks at 10 percent moisture content yields approximately 11 megajoules (MJ), compared with 29 MJ from 1 kg of anthracite and 36.3 MJ from 1 litre of kerosene (Phan *et al.*, 2000). Rice husks have been used in China and Myanmar (FAO, 1990) for electricity generation. Rice husks have been used to generate heat and energy for grain drying (FAO, 1990; Phan *et al.*, 2000; Castillo-Nino, 2007). Recently, a cyclonic burner that can generate up to 10 million Btu per hour by consuming over 1 tonne of rice husk (i.e. the equivalent of the energy generated from burning 74 gallons [approx. 300 litres] of diesel) was developed in Thailand (Castillo-Nino, 2007). Rice straw is a particularly attractive feedstock for making liquid fuels. About 70 to 80 gallons [approx. 300–350 litres] of ethanol could be produced from 1 tonne of straw (Clausen, 2007). In December 2006, the foundation stone of a project for the generation of power from rice straw and other farm wastes was laid down in the village of Ghanaur in Patiala District, India (Singh, 2006). The efficient use of rice straw and husks for feed and fuel production would enhance the competitiveness of rice production while minimizing the competition for land and water resources due to the production of crops for feed and fuel.

CONCLUSION

Global rice production has been rising strongly since 2002. However, the food security of more than 3 billion people continues to require substantial effort and support from all stakeholders in rice production for the rest of the decade. In order to maintain the per capita rice output obtained in 2005 (97.4 kg/person), the global rice output should reach about 652.5 million tonnes in 2010 (i.e. 23.2 million tonnes more than 2005). Land and water resources for rice production in the near future may be significantly affected by global climate change. Also, recent developments indicate that the land and water resources for rice production could be under intense competition from the production of crops for feed and fuel. The competitiveness of rice production could be enhanced with the use of NERICA and hybrid varieties to increase yield in the near future. Also, the yield of existing irrigated rice varieties could be substantially increased with the integrated application of good management practices. In rainfed lowland ecologies, yield and productivity could be increased with on-farm water harvesting facilities. Increased conversion of rice straw and husks into feed and energy could minimize the competition for land and water resources due to the production of crops for feed and fuel while enhancing the competitiveness of rice production in general.

REFERENCES

Abdulrachman, S., Las, I. & Yuliardi, I. 2005. Development and dissemination of integrated crop management for productive and efficient rice production in Indonesia. *IRC Newsl.*, 54: 73–82.

Anon. 2006. Resultados do Projeto CFC sao appresentados em Cachoeirinha. *Lavoura Arrozeira, Porto Alerge*, 54(440): 28.

Anon. 2007. Biofuels new digest. *World Grain*, Jan. 2007: 38–42.

Brown, L.R. 2005. *Outgrowing the earth*. Earthscan, Sterling, VA.

Castillo-Nino, A. 2007. Using rice husk as heating source. *World Grain*, Jan.: 59–60.

Clausen, E. 2007. Rice and bio-energy push (available at www.deltafarmpress.com/news/070308-bioenergy-push/).

Darwin, R., Tsigas, M., Lewandrowski, J. & Raneses, A. 2005. *World agriculture and climate change: economic adaptation.* USDA Agricultural Economic Report No. 703. 86 pp.

Donley, A. 2007. A new way to produce ethanol. *World Grain*, Jan.: 33–35.

Downing, T. 1992. *Climate change and vulnerable places: global food security and country studies in Zimbabwe, Kenya, Senegal and Chile*. Research Report No. 1. Oxford, Environmental Change Unit, University of Oxford.

FAO. 1988. *Report of the mission on Viet Nam*. Agricultural Sector Review.

FAO. 1990. *Rice by-product utilization in selected countries in Asia*. Bangkok, FAO.

FAO. 2007. *Rice price update, Mar. 2007*.

FAOSTAT. FAO Statistical Database (available at www.fao.org/faostat/).

Hill, J.E., William, J.F., Mutter, R.G. & Greer, C.A. 2004. The California rice cropping system: agronomic and natural resource issues for long-term sustainability. *In* A. Ferrero & F. Vidotto, eds. *Challenges and opportunities for sustainable rice-based production systems*, p. 85–99. Edizioni Mercurio, Vercelli, Italy.

Kluger, J. & Lemonick, M.D. 2001 Global warming. *Time Magazine*, 23 April: 51–59.

Kueneman, E.A. 2006. Improved rice production in a changing environment: from concept to practice. *IRC Newsl*., 55: 1–20.

Lacy, J. & Steel, F. 2004. *RiceCheck – Participatory farmer extension model in practice for 18 years*. Paper presented at Fourth International Crop Science Congress, Brisbane, 26 Sept. – 1 Oct. 2004.

Lyddon, C. 2006. Bullish on grain. *World Grain*, Nov.: 43–45.

Lyddon, C. 2007. Europe races to produce more green fuel. *World Grain*, Jan.: 28–32.

Nguyen, N.V. 2006. *Challenges to ensuring food security through rice*. CAB reviews 2006 1, No. 067.

Nguyen, N.V. & Ferrero, A. 2005. Meeting the challenges of global rice production. *Paddy Water Environ*, 4: 1–9.

Pham, T.S., Trinh, K.Q. & Tran, D.V. 2005. Integrated crop management for intensive irrigated rice in the Mekong Delta of Viet Nam. *IRC Newsl*., 20: 91–96.

Phan, H.H., Nguyen, V.X., Nguyen, H.T. & Le Van Ban va, T.V. 2000. *May say hat o Viet Nam*. Ho Chi Minh, Nha xuat ban Nong Nghiep.

Ponnamperuma, F.N. & Bandyopadhya, A.K. 1980. *Soil salinity as a constraint on food production in the tropics*, p. 203–216.

Singh, B. 2006. *Punjab gets world's first rice straw power station* (available at www.punjabnewsline.com/content/view/2159/38/).

Tran, D.V. & Nguyen, N.V. 2001. Declining productivity gains and the yield gap in rice. *In* J. Dixon, A. Gulliver & D. Gibbon, eds. *Farming systems and poverty – Improving farmers' livelihoods in a changing world*, p. 361–66. FAO, Rome and World Bank, Washington, DC.

Production globale de riz: résultats et défis 2000–10

La production mondiale de riz a connu un déclin accentué entre 2000 et 2002 avant de rebondir. Malgré cette reprise, la production per capita en 2005 restait inférieure à celle de 1999; de plus, le simple maintien de ce niveau de production à l'horizon 2010 nécessiterait une production annuelle augmentée de 23,2 millions de tonnes au moins. Les changements climatiques globaux pourraient avoir un effet significatif sur la production de riz au cours de la seconde moitié de la première décennie du siècle. Qui plus est, on peut penser, sur la base de l'évolution récente, que les ressources en terre et en eau utilisées pour la production rizicole pourraient bien faire l'objet d'une concurrence intense du fait de la production de biocarburant et d'aliments pour le bétail. Cependant, l'évolution suivie par les prix du riz depuis 2002 a amélioré la compétitivité de la production rizicole. Les variétés NERICA et hybrides restent très prometteuses en termes d'amélioration continue du rendement, tandis que la mise en œuvre intégrée de bonnes pratiques culturales améliore de façon substantielle le rendement des variétés existantes, tout en renforçant l'efficience de l'utilisation d'intrants et en limitant les volumes d'eau nécessaires pour la production rizicole. D'autres possibilités techniques pour améliorer la compétitivité et la durabilité de la production rizicole et sa contribution à la sécurité alimentaire au cours de la seconde moitié de la première décennie du XXIe siècle sont le recours à des installations de collecte d'eau au niveau de l'exploitation agricole, et l'utilisation économiquement efficiente des pailles et balles de riz pour la production d'énergie et d'aliments du bétail.

Producción mundial de arroz en 2000–10: resultados y desafíos

La producción mundial de arroz disminuyó bruscamente entre 2000 y 2002, después de lo cual experimentó una recuperación. Sin embargo, el nivel de producción de arroz per cápita en 2005 seguía siendo más bajo que en 1999; además, para mantener este nivel de producción hasta 2010 deberán producirse, como mínimo, 23,2 millones de toneladas más. Los cambios climáticos mundiales pueden tener un efecto importante en la producción arrocera durante la segunda mitad del primer decenio. Además, los acontecimientos recientes indican que los recursos de tierras y aguas para la producción de arroz pueden ser objeto de una competencia intensa entre la producción de cultivos y la de piensos y combustibles. Al mismo tiempo, la evolución de los precios del arroz desde 2002 ha incrementado la competitividad de la producción arrocera. NERICA y las variedades de arroz híbrido siguen ofreciendo posibilidades de obtener rendimientos aún mayores, mientras que la aplicación integrada de buenas prácticas de gestión se traduce en un aumento sustancial del rendimiento de las variedades de arroz existentes, potencia la eficiencia de los insumos utilizados, y reduce la cantidad de agua aplicada en la producción. Las instalaciones de captación de agua en las fincas y el uso eficiente de la paja y los hollejos de arroz para producir piensos y combustible constituyen, por otra parte, otras tantas opciones técnicas útiles para aumentar la competitividad y sostenibilidad de la producción de arroz con miras a la seguridad alimentaria en la primera década del siglo XXI.