Agriculture, Biosecurity, Nutrition
and Consumer Protection Department
Food and Agriculture Organization
of the United Nations

Rice faces the future

Urbanization, diminishing land and water resources, climate changes, and uncertainties over domestic support and trade pose new challenges to world rice production

At the height of the International Year of Rice in 2004, FAO rice specialist Nguu Van Nguyen received an email from a colleague in Liberia. Attached was a photograph of a roadside billboard near the capital, Monrovia, emblazoned with the IYR logo and its catchy slogan: *Rice is life*. It wasn't the logo that caught Nguyen's eye (as a member of IYR's organizing secretariat, he had had seen it literally thousands of times) but what was printed underneath: "Yet all is not well in the world of rice". Nguyen recalls: "I thought: Ah! There they have really got the message."

In declaring IYR 2004, the UN General Assembly gave long overdue recognition to the world's main staple food, and its place at the heart of Asia's cultural heritage. But it also aimed at focussing attention on the future of rice: as a food, as a vital component of the agricultural sector, and as a major building-block of global food security. That future is clouded by diminishing land and water resources, climate change, and uncertainties over policy and trade that could have profound impacts in many countries.

Changing environment. The next meeting of FAO's 61-nation International Rice Commission, to be held in Peru in May 2006, will focus on the challenge of improving rice production in a changing environment. The major change, says Nguyen, who also serves as the Commission's secretary, is growth in world population, expected to rise from 6.2 billion in 2002 to more than 8 billion in 2030.

Most of this increase will be in urban areas, which will create ever greater demand for rice but will also take resources, especially water, from rice production. Urbanization also revolutionizes rice distribution and marketing, giving rise to convenience stores and supermarket chains that pressure agriculture to meet higher quality and safety standards and to lower costs. At the same time, it creates demand for a more varied diet that will encourage

diversification of rice-based production systems into more lucrative sub-sectors. "In the future, there will undoubtedly be fewer resources for rice production," says Nguyen, "which means less rice if yields do not increase. For the urban poor, less rice means less food security."

How can rice production respond to those challenges? First, says Nguyen, by increasing rice yields, both per season and per unit area, in order to reduce costs and increase output and make rice production economically competitive. One available option - for countries with well-organized seed production systems - is hybrid rice, first cultivated commercially in China in the 1970s, which produces at least 20 percent more grain than standard high-yielding varieties. Recently developed "super hybrids" have increased yield by a further 20 percent.

Meanwhile, plant breeders at the West African Rice Development Association (WARDA) have developed NERICA ("new rice for Africa") varieties that combine rice types already adapted to the local environment with high-yield Asian cultivars. NERICA is not only drought-tolerant, but produces yields 30 percent higher than traditional African varieties. Its short growing season is especially suitable in sub-Saharan Africa, allowing farmers to take advantage of the short rainy season in drought-prone areas.

Although NERICA was developed mainly for the rainfed uplands, researchers hope to develop other varieties for irrigated and lowland systems: West and Central Africa have some 20 million ha of inland valley swamps that are well suited for rice production, although less than 20 percent is currently being used.

Solar radiation. Rice production efficiency can also be increased through improved crop management. Recent studies in Asia and Latin America indicate that varieties are not the primary limitation on better yields - currently available varieties are capable of producing more than 10 tonnes of rice per hectare, yet farmers are exploiting less than 50% of that potential. The studies also show that higher yields are more feasible in more favoured ecologies: all high-yielding environments - from California to Egypt - enjoy high solar radiation during the critical phase of panicle initiation to flowering. By focusing production in the dry season and under irrigation, farmers could explore more profitable uses of land during the wet season. In many parts of Asia, for example, fish farming might provide more income than rice during the monsoons.

"Rice farmers can also increase their profit margins by improving the efficiency of production inputs, such as water and fertilizer," says Nguyen. Greater efficiency would also reduce damage to the environment - insecticides can destroy much of the biodiversity found in rice ecosystems, while fertilizer residues contaminate water and soil in and around rice fields.

Depletion of freshwater is another worrying aspect of rice production, particularly of irrigated rice which accounts for three-quarters of total output. On experimental plots, it takes between 1,100 and 1,200 litres of water to produce 1 kg of paddy rice. In the real production world, however, the amount of water used is often much higher. Says Nguyen: "The need to produce more rice for more people on less land with less water is a challenge for science and technology as well as the rice-farming communities."

Rice is both a contributor to climate change - flooded rice plants release the greenhouse gases methane and nitrous oxide - but also a potential casualty. Forecast increases in average temperatures, higher sea levels and changes in rainfall patterns will all have a negative impact on rice, especially in the tropics. Existing rice varieties with tolerance to high temperatures, salinity and other types of extremity will help farmers cope with those changes. But rice farmers can help mitigate climate change by, for example, reducing the time their crop spends under flooded conditions and turning rice husks into biofuel, a substitute for fossil fuel.

Tradable commodity. The IRC meeting will also examine pressing policy issues. Rice is considered the world's "most protected crop", with governments playing an active role in pricing, input supply, procurement and trade - interventions justified by the importance of rice production in national economies and food security, particularly in Asia.

But with rice increasingly viewed as a tradable commodity, and less as a subsistence crop, rice protection policies are being challenged in world trade negotiations. A report to the IRC meeting notes that trade in rice is expanding, although it remains relatively small at 26.7 million tons in 2004. Liberalization policies fostered by the WTO Uruguay Round Agreement in the late 1990s were a driving force growth in trade, but the failure of the WTO Cancun meeting - over agriculture in general and rice in particular - signalled that "market access and export competition still remain to be resolved", while changes in domestic support policies appear to be even more difficult to negotiate.

Freer trade in rice would have "substantial impacts" on national production, farmer income and consumer preferences and prices in many countries. "Marginal areas with relatively low yield potential are under intense pressure from more economical crop or activities," the report says. "Access to international rice markets will accentuate pressure to remove rice from these marginal production areas."

"The issues and challenges facing rice call for continuing reflection and debate," says Nguu Van Nguyen. "IYR can be considered truly successful once high quality rice is available, accessible and affordable in both urban centres and rural areas around the globe. Raising awareness of that need is just the beginning."

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