Conserving Folk Rice Varieties

- why and how ?

Centre for Environment and Development Calcutta, has an on-going programme on folk rice conservation in West Bengal. An outline of the experiences gained while conducting the study is narrated here by ***Mr. Debal Deb****. The loss in rice varieties is tremendous, we know. The study confirms this. The programme encourages in-situ conservation and to facilitate the work, a centre for exchange and documentation of local variety seeds has already been established in Bankura.*

Ever since its domestication some 5000 to 6000 years ago, the Indian rice (Oryza sativa var. indica) has undergone countless experiments by generations of farmers. Rice is typically a tropical wetland crop that is best suited to warm, humid climate, and grows well in lowlands. However, some farmers who wanted to have this wonderful cereal crop grow in their farm in an upland terrain, selected some lines of rice that gradually adapted to the upland conditions with less water availability. Others wanted their rice to grow in areas where the rain comes too late. Still others wanted to cultivate rice in an area where flood occurs. Numerous selection experiments went on over millennia, and thousands and thousands of breeds, also called cultivars, of rice were thus developed by generations of ingenious farmers of the Indian subcontinent. As a result, we have different folk varieties of rice adapted to different types of soil & topography — dry upland, inundated lowland, rainfed medium land — and to climatic vagaries: drought, late rain, early rain, too much rain, excessive cold, and so forth.

The folk cultivars were selected for an amazing range of traits. To give just a few examples, at least three cultivars are grown in the Sundarban marshlands washed by tidal sea water. In eastern Himalayan region, a frost-resistant variety is grown that matures

at low temperatures — even four degrees below zero. In Bankura, one of the driest districts of Bengal (average 300 mm annual rainfall), tribal peasants grow a local variety in their otherwise unproductive sloppy uplands bereft of any irrigation facility. In the southern districts of Bengal, farmers grow certain varieties in perennial wetlands where the plants grow about a foot above the water surface, even though the water is 8-foot deep. In Birbhum, marginal farmers grow an upland variety which is never lodged by strong winds. A number of folk cultivars are known to be resistant to bacterial blights, while some others are resistant to different insect pests.

Many old farmers reported to us a unique variety of rice with two grains covered by the hull. In some places the variety is called Jugal (couple). There is another, more imaginative name —Sateen (co-wives), likening the two grains to two wives of a man living in 'the same house. There is also reports of a variety of Sateen that has three grains: a long grain flanked by two small ones on either side — the two wives with their husband — within the same hull. But our attempts to collect samples of this variety have failed, because farmers have discontinued its cultivation. In spite of this frustrating experience, we hope to find out the last stock of the variety someday, somewhere.

This wonderful diversity of folk rice cultivars were selected and bred by farmers not only for growing rice under different climatic and soil conditions, but also to cater to various gustatory and aesthetic pleasures: Sita-sal, Sada Jhulur, Dudheswar and Dudh Kalma for white, fine grained rice; Tulsi manjari and Jira-sal for small grains; Madhu malati, Bou-pagli Bakul-ful and Kaya for tasty cooked rice; Lal Jhulur, Balam, Chandrakanta, Dahar A'agra and Bhasa Manik for high-quality popped rice or muri; Kanakchur, Raghu-sal, Binra and Lakshmi-chura for flavorful puffed rice or khoi; and Basmati, Benapul , Govinda-bhog, Benapuli, Bhim-sal, Kamini-bhog etc. for their exquisite aroma. All these characteristics were identified and consciously selected by farmers. The evolution of rice as we see it today is therefore the result of natural selection combined with artificial selection by humans.

Until the advent of the Green Revolution, over 42,000 folk cultivars were recorded to have existed in India. The aggressive advertisement and marketing of a handful of "high yielding varieties" (HYVs) promoted by national and international agencies, have since the late 1960s systematically pushed most of the folk crop varieties to extinction. It is known that by the l980s, more than 80 per cent of India's rice farms were under a handful of HYVs. Nobody knows exactly how many of them are now being cultivated. Beginning with the so-called 'miracle seeds" of IR-8 and Taichung rice, the Green Revolution has wiped out thousands of folk rice varieties in just 30 years. And the process of this destruction is continuing. Even in the arid lands of Bankura and Birbhum, where HYV is unsuitable, farmers have installed shallow pumps for irrigation to grow HYV rice, and abolished almost all old folk varieties through disuse. Only a few years ago, Kelas was fairly popular in the district of Bankura. Today Kelas is cultivated only by a dozen marginal farmers who are too poor to buy "inputs" necessary for cultivating HYVs. The same thing is happening everywhere in India.

In West Bengal, over 4,800 varieties of rice were grown until the 1960s. The exact number of the folk varieties that are still being cultivated is not known, but a recent survey in 1994 indicates that around 200 varieties may still be found in the State; we may have already lost about 96% of the folk rice genetic diversity in Bengal. It is high time to consider the consequences of the disappearance of these folk varieties. There are evidences that extinction of populations may lead to species extinction. If a species' genetic variability is diminished, its ability to evolve in response to changing environment will be proportionately restricted. Hence its extinction probability is increased.

If the current trend toward genetic uniformity continues through HYV monocultures, our food security will be severely imperilled. Homogenisation of rice would entail that a single disease or pest outbreak may ruin all crops in the field. Folk varieties provide the genetic raw material for improvement of rice cultivars, and the loss of that genetic basis would forestall the possibility of incorporation of new genes from populations that confer resistance to pests, diseases, soil salinity, and so on. The recent discovery of a wild rice variety in south India and Sri Lanka containing a gene for resistance to the rice Tungro virus has enabled researchers to incorporate the gene into certain new cultivars and avoid disasters. We do not know how many such genes have been lost with the disappearance of the thousands of folk cultivars. We shall never know.

How to conserve the existing folk rice varieties. There are two ways to conserving crop genetic diversity. Endangered crop varieties can be stored ex situ, or

away from the farm, in seed banks or gene banks. The preserved seeds or genetic materials can then be used by agricultural scientists to isolate different traits for incorporation into new breeds of crops. In situ, or on-site conservation, on the other hand, requires that the seeds of the varieties to be conserved, be grown and multiplied on farm fields, where the desired traits can be refined through adaptations to changes in the natural environment.

Farmers have almost no access to ex situ gene banks. Gene banks hardly ever provide the farmer with seeds of the crop varieties he wants. Instead, gene banks exploit the seeds collected from farmers, to produce HYVs, which are immediately usurped by a handful of multinational firms for sale to the farmer. The HYV seeds are sold to the farmer as a component of a package including a set of chemical fertilizers and pesticides, and a blanket prescription of how and how much to use them. And the folk variety seeds get lost in the process.

In contrast, folk crop varieties have traditionally been conserved in situ by farmers through customary exchange of seeds of their choice with neighbours. Exchange of seed among farmers traditionally took place across villages, districts and even provinces. The advent of market economy disrupted this custom by commoditising the seeds. With the rapid disappearance of most folk varieties, exchange has become more difficult, because farmers possessing folk varieties are surrounded by neighbours who all grow HYVs. To find a desired variety in a district is like searching for a needle in a haystack.

One solution to this problem is to set up a local seed exchange centres, with the objective of promoting in situ conservation. Such a seed exchange centre would make an inventory, and store seeds of different folk cultivars for multiplication and use by farmers themselves.

One such seed exchange centre has been established this year at Beliatore in Bankura District of West Bengal. Funded and supported by Navadanya, New Delhi, the centre is named Vrihi Beej Binimoy Kendra, and is the first of its kind in eastern India. (Vrihi is the Vedic name for rice.) The centre now has a collection of over 170 accessions of folk rice variety samples collected from the districts of Bankura, Birbhum, Medinipur and Purulia. The centre has already given out seed samples of different folk varieties to willing farmers, in exchange of other varieties they grow. Some farmers did not have any folk rice varieties in their stock, but were willing to reintroduce folk rice varieties in their farms. They were also given seed samples for free, on condition that they will return to the centre twice the amount of the seeds after harvest. The seeds received from a farmer will go to another farmer, and the circle of exchange will expand.

The Vrihi centre is gathering blessings of farmers of the four (western) districts who have enriched it with their donation of seeds — yellow, black, brown, ochre, shiny, long, tiny, thick, slick, awned, bristly, strongly aromatic, faintly fragrant seeds — seeds that were born of the wisdom and ingenuity of our farmers.

A world without water?

The World Water Council, pointing out that the demand for fresh water doubles every 20 years, reported that in 1950, only 12 countries with 20 million people faced water shortages; but in 1990, it was 26 countries with 300 million people and by 2050, it is projected to be 65 countries with 7 billion people, or 60% of the world population.

According to a report of the CSD Secretariat, over 8% of the world's population now live in countries that are highly water stressed and another 25% in countries with moderate to high water stress. If current trends in water use persist, two-thirds of the world's population could be living in countries with moderate or high water stress by 2025. The report says that an analysis under the Comprehensive Assessment of Fresh Water Resources of the World gives rise to serious concerns as to the sustainability of current pathways of water resources development and utilization in many developed and developing countries alike.

Competition for surer water resources is now widely predicted to be an increasingly important source for conflict between countries sharing waterways and also within countries