Traditional rice farmers preserving India's rice biodiversity

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In May 2009 super cyclone "Aila" swept the Sunderbans in eastern India and thousands of hectares of rice were ruined overnight and the area completely submerged in salt water. **A handful of traditional rice farmers sowed three salt-tolerant rice varieties. These farmers were the only ones who harvested some rice in the following winter. These are not the imported and cross-bred "miracle high yielding hybrid rice" varieties about which our rice experts keep boasting day in and day out, all of which were devastated by the titanic Aila. Rather, they are the result of the painstaking work of one person, who, over the years, in a remote village in Odisha (Orissa), is preserving our age-old traditional rice varieties for posterity so that India does not lose its invaluable rice germplams.**

Lit by a kerosene lamp, the two room hut just outside a sleepy hamlet in Odisha's Rayagada district can easily pass off as any other farmer's house in this tribal region. Step inside and one will be taken aback by the hundreds of earthern pots labelled with coded stickers stacked in a corner as well as under a bed. These pots treasure over 750 varieties of rice grains, some on the verge of extinction. The keeper of the seed bank, Debal Deb, has been collecting and conserving these rare native varieties over the last two decades. He does not hire "trained" agricultural experts. His only help are the farmers who continue to depend on "heirloom" (traditional) seeds, which have a glorious past.

Odisha is home to some of the rarest rice germplasms of the world. It has the Central Rice Research Institute (CRRI), now under the control of the Indian Council of Agricultural Research (ICAR). It's first Director, late Dr Riccharia, was perhaps the best rice breeder the world has ever seen, a rice breeder par excellence who was not a "run of the mill" agricultural scientist like those of the present day, but a committed scientist with a great vision for the future of rice in India and who wanted to preserve our rarest of rare rice gene bank so that the poaching West could not snatch them away, through a "hand-in-glove" operation as had happened in early 1960s when some of our own "scientists" gifted these to the Americans through the back door.

Had he been allowed to live and work peacefully, India's agricultural destiny would certainly have taken another route, certainly in rice agronomy. He was not just a gifted rice scientist, competent and committed, but, above all, a patriot to the core. But, because he would not succumb to the Western lure of money and "awards", he was hounded out of office, to the detriment of India, but that is another story.

A modern day Riccharia is Dr Debal Deb, a PhD from Calcutta University and post-doctoral research in ecological economics and marine and estuarine resources from the University of California, Berkeley, USA, and at the Indian Institute of Science, Bengaluru. He has now set out to accomplish what late Dr Riccharia could not. Adjacent to the hut, the "Rice Gene Bank"

easy task.

Barely half a hectare means Deb gets just 4 square metres of land to grow each variety, where he can plant only 64 paddy hills. This is just above the minimum viable size of about 50 hills required to maintain the genetic resource of a crop. Then there is the problem of maintaining the genetic purity of landraces grown next to each other. The internationally recommended isolation distance of at least 110 metres is an impossible task to maintain on such a small-sized farm.

Yet Deb had managed to overcome this constraint by planting each variety surrounded by the ones with different flowering dates. After harvesting and threshing the rice plants, he saves some seeds in his earthern pots, and distributes the rest among the farmers to promote their use and make people aware of their advantages over the "imported" hybrid varieties. His conservation strategy was recently published in the reputed science journal, *Current Science.*

What does it take to maintain this rice gene bank and help the poor farmers?

It takes a lot of planning. Every year, it takes Deb and his committed "farmer assistants" several days and nights to map and allocate appropriate plots to all the 750-odd varieties before transplanting their seedlings. Even though rice is a self-pollinating crop, there is always the risk of cross-pollination. That is why, to avoid this, he surrounds planted variety with ones which flower on different dates and prevents cross pollination.

Following this, he eliminates the "off-type" plants within each population at different life stages of the plant, based on their basal sheath colour, presence or absence of awn (a needle like plant part), grain colour and grain size. Based on matching these characteristics for eight years, he succeeds in obviating the likelihood of genetic inter-mixing. Thus, all the seeds distributed among the farmers are 100% genetically pure, except some occasional or undetected mutations.

What is the greatest challenge to this strenuous path in preserving India's rich rice bio diversity?

This rare rice gene bank, named Vrihi, faces the greatest threat from two sources: First, an unscrupulous farmer who might clandestinely hand over some of these rare seeds to multinationals or their compatriot Indian poachers. Recently a committed organic farmer of Odisha, 80-plus retired school teacher, Natwarbhai, who has a collection of 360 rare rice varieties from the state, including the rarest of rare black coloured Kali Jiri, sadly recounted how an institution from Chennai, run by a famous scientist, had taken some samples of this rare rice variety from his rice fields, and then claimed credit for the variety as its own! The second threat is official apathy. The hugely funded ICAR and CRRI will simply have nothing to do with Vrihi. One cannot fathom the (scientific) reason!

It is very important that some patriotic organization comes forward to take the torch forward, ensuring that even when Dr Deb is no more this unique work is not lost to the nation, or falls into the hands of unscrupulous persons. **It is not just a question of accession, but also of keeping all the varieties alive in situ, every year, maintain their genetic purity, and distribute the seeds free of cost to the needy farmers, and train them in seed saving techniques which are unfortunately getting forgotten very rapidly.**

The indigenous farmers are willing to grow these rare varieties for their intrinsic, aesthetic and rare cultural traits (tolerance to salinity, diseases etc.), not for pecuniary or quantitative gains. It is just a matter of immense faith in the traditional rice culture of the land. These farmers must remain the custodians of the treasure created by Dr Deb. He has applied for registration of

secure Intellectual Property Rights (IPR) in the name of farmers' communities. He has also tried to secure the IPR of the knowledge of the folk rice varieties by publishing a book in 2000 and conferring the copyright on Vrihi. Dr Deb confesses his inability to vouch for absolute protection from bio-piracy. It will be a tragedy if any part of the heirloom falls into the wrong hands, as happened in the case of Natwarbhai's Kali Jiri rice variety. Before such unfortunate things happen, a patriotic organisation with committed persons should come forward and help Dr Deb preserve this monumental work of the last few decades so that India's very rich biodiversity in rice remains with Indians and not anyone else.

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