The Economist

How better rice could save lives

A second green revolution

Technological breakthroughs in rice will boost harvests and cut poverty. They deserve support

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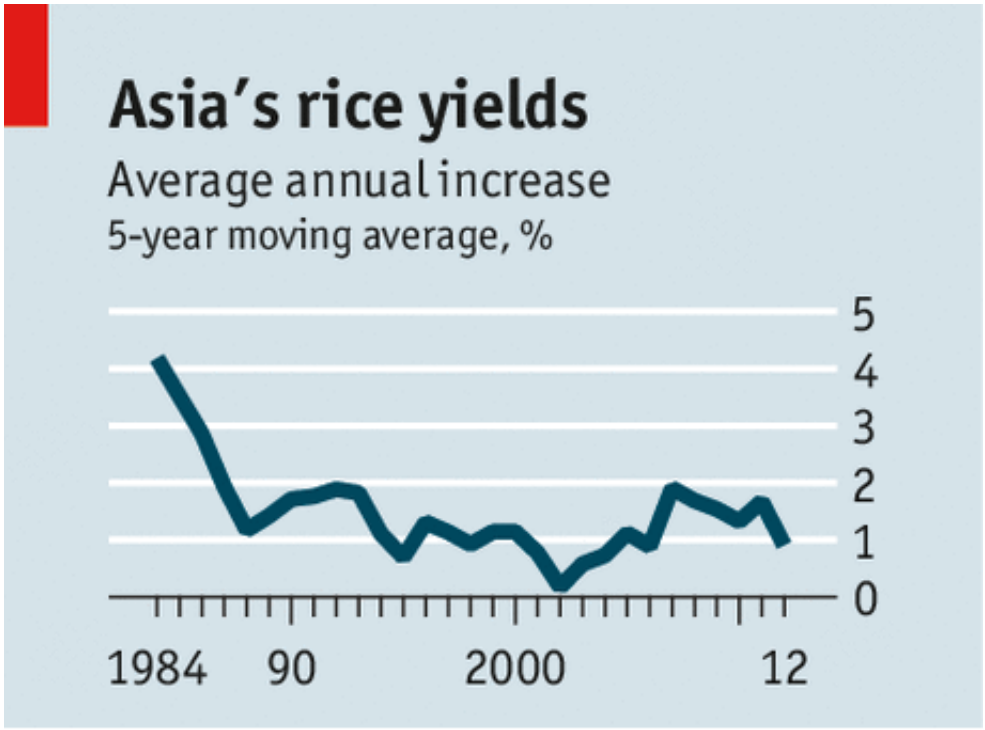

WHEN, in 1961, the government of India asked a celebrated wheat breeder, Norman Borlaug, for advice about new seeds, the subcontinent was thought to be on the verge of starvation. China actually was suffering from famine. Borlaug persuaded India to plant a new semi-dwarf variety of wheat in Punjab. The next year, the country also tried out a dwarf variety of rice called IR8. These short-stemmed crops solved a basic problem: old-fashioned crops were long and leggy, so when fed with fertiliser they grew too tall and fell over. Borlaug's varieties put out more, heavier seeds instead. They caught on like smartphones. Over the next 40 years the green revolution spread round the world, helping ensure that, where its seeds were planted, famines became things of the past.

Now a second green revolution is stirring in the fields of Asia. It will not be the same as the first one, since it will depend not on a few miracle varieties but on tailoring existing seeds to different environments. But it promises to bring similar benefits—this time to the poor lands and poorer farmers that the first version passed by (see article (http://www.economist.com/news/briefing/21601815-another-green-revolution-stirring-worlds-paddy-fields-bigger-rice-bowl)). Such lands are poor because they are prone to floods, drought

and salinity. New seeds have been developed which can survive flooding, and soon there will be varieties that tolerate drought, extreme heat and saltiness, too, making the poorest lands fertile. So the second revolution could do even more to cut poverty than the first.

This revolution is all the more vital because the gains of the first are plateauing. Annual yield growth has fallen to less than a third what it was in the green revolution and below the current rise in population. Meanwhile demand for rice is rising by almost 2% a year in Asia and soaring by 20% a year in Africa.

The gap threatens to widen, because rice is exceptionally vulnerable to environmental change. Rice farmers use almost a third of Earth's fresh water, and water shortages are pervasive. The world's rice bowls are the deltas of Asia's great rivers. These are subject to changing floods, rising salinity and growing heat stress. (Climate change is sometimes seen as a new problem to worry about now that the issue of providing food is settled. In reality it is a threat to future food supplies.)

A second revolution has been made possible by the sequencing of the rice genome in 2005 (the first cereal crop to be sequenced). This enabled breeders to discover the genes for flood resistance in one obscure variety from eastern India and transfer them to varieties all round the world. Breeders will soon do the same for genes that provide other valuable traits.

There are all sorts of things that governments could do to push this revolution forward, such as getting rid of price subsidies and letting farms consolidate into bigger, more efficient units. But they will also need to spend public money directly on research.

One grain at a time

The first green revolution was largely government-backed, with help from international research centres and American charities. You might think that nowadays the big agribusinesses would be desperate to lead the way, and they have indeed invested heavily in new strains of maize and wheat. But rice, the focus of the second revolution, is different. Farmers can keep the seeds from one harvest and plant them in the next with no loss of yield (unlike maize). The market for rice seeds is thus tiny, so almost all research is carried out by the state.

The amounts needed are small. By one calculation, $3 billion of rice research spread over the next 25 years would pull 150m people out of extreme poverty. That is $20 a person, a bargain compared with any other anti-poverty programme. And it has worked before. The cumulative economic benefits from public research into rice are running at almost $20 billion a year, hundreds of times the cost of the investment.

Governments, though, are nervous. Some politicians worry about publicly backing genetic

research, despite all the lives it could save (the latest Luddism is in Vermont—see article (http://www.economist.com/news/united-states/21601831-little-state-could-kneecap-biotech-industry-vermont-v-science)). Other health ministries have moved on to sexier causes, like fighting obesity. They should think again. It is hard to think of a way to improve more people's lives for less money.

From the print edition: Leaders