A Biotech Developmental State? The Chinese Experience

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DEMOCRATISING BIOTECHNOLOGY

The biotechnology revolution has almost overwhelmingly been a private sector phenomenon. This alarms many who, aside from other concerns, fear the consolidation of the agri-food industry in the hands of a few multinationals. Two scenarios for the developing world are often imagined: either genetically modified crops will intensify the industrialisation of agriculture in a way that is particularly harmful for poor farmers, with corporations getting the benefits while processes of marginalisation intensify. Or, they will be largely an irrelevance, with transgenic product portfolios way out of the price range of the world's poorest farmers, beyond a few high-profile goodwill projects. China's experience with biotechnology has been very different from other countries. Critically, the state has determined the objectives and led the process. Does this Chinese 'developmental state' model suggest that alternative more pro-poor biotechnology futures are possible?

In China, biotechnology research and development has been the preserve of the public sector. This is not unusual in itself, as private sector research is small in many developing countries. What is significant in the Chinese case is the scale and intensity of state commitment. This means that the profile of biotechnology products emerging from research is very different from most other developed and developing country settings (see box).

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China has not so far, for example, concentrated on the herbicide-resistant crops that have been a priority of multinational corporations. The emphasis has been more on producing new seeds that lower input costs for farmers, rather than tie them into particular proprietary chemicals. In the case of Bt cotton some farmers have already made significant savings (see Briefing 10). Also, there has been more emphasis on non-transgenic techniques of less interest to the private sector, because they are less likely to result in patentable products: marker-assisted selection, for example. Meanwhile, crops are being developed with a 'pro-poor focus', including stress tolerant crops suited for dry, low-fertility or saline settings.

CHINA'S BIOTECHNOLOGY ACHIEVEMENTS

China will spend $500m per annum on biotechnology research by 2004, in over one hundred labs and research institutes. In 2002 one of these institutes decoded the rice genome. Field trials have been carried out for all key crops and research is underway on an extremely wide range of traits. Four crops have so far been commercialised: peppers, tomatoes, petunias and cotton. Bt cotton is the most important of these and now accounts for as much as 35% of the cotton grown in China. Around half of this area is planted with varieties developed at the Chinese Academy of Agricultural Sciences. Biocentury, the company spun off from CAAS is now looking to commercialise its products in India, Vietnam and parts of Africa. One advantage of Chinese seed in this respect is that it is cheaper than that of its rival Monsanto. The other side of Chinese investment in biotechnology has been a policy of controlling corporations: forcing them to operate through joint ventures with Chinese seed companies; restricting their access to local germplasm; demanding comprehensive biosafety assessments; and controlling their expansion.

Despite the achievements there are dilemmas when the Chinese example is used to either present biotechnology as problem-free for poor farmers, or as an example of an alternative model for the GM revolution. Key questions that need to be thought about include:

- do the huge state investments in research lead to pressure to commercialise new crops and override biosafety concerns, as some Chinese ecologists would claim in relation to Bt cotton?
- what are the opportunity costs in relation to other non-transgenic forms of agricultural research? The vast resources committed to biotechnology laboratories inevitably mean a diversion from conventional research programmes, some of which might offer more to poor farmers and might be more ecologically appropriate.
- over the longer-term will state research institutes and their spin-off companies increasingly behave like corporations and focus on creating income-earning products, rather than technologies for marginalised farmers?

■ are farmers really able to influence types of new GM technologies being developed on their behalf?

■ do farmers and consumers have enough information to be aware of the risks associated with transgenics?

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COMPETING PRESSURES ON CHINESE POLICY-MAKERS

Trade and livelihood concerns
A decision to commercialise transgenic varieties of major food crops could have implications for exports to EU markets (see Briefing 5). It might also restrict scope for excluding imports of more competitive US GM soya beans and maize, following entry into the WTO. This could have implications for the livelihoods of farmers in China's economically troubled north-eastern provinces.

Don't get left behind
China has invested heavily in biotechnology. Starting with Deng Xiaoping, senior leaders have viewed biotechnology as a key area of the knowledge economy, one where China must not be left behind. However, some policy-makers complain that they are now under pressure from influential scientists who argue that China must not be over-cautious, and should begin to capture the returns from its substantial investments in GM crop research.

Biosafety management
Officials are also aware that, with China's diverse smallholder farming systems, implementing biosafety regimes is very difficult. This is an argument against the commercial-isation of Bt maize in the Chinese north-east, for example. Non-Bt maize is a key refuge crop in China's Bt cotton growing areas. Policy-makers fear that, if maize were commercialised in north-eastern provinces, seed would quickly travel south and be used in the cotton zones. Further to this, for crops where China is a centre of origin – rice and soya beans, for example – biodiversity concerns cannot be taken lightly.

Sceptical Chinese consumers
The growing Chinese urban middle-class is increasingly informed about food safety issues. Some recent opinion polls suggest that substantial opposition to genetically modified foods is a real possibility.

The Chinese developmental state can, it seems, promote a different type of biotechnology. However, there are dilemmas associated with the Chinese model of biotechnology development. Chinese policy-makers are now more circumspect about GM crops than popular media images often suggest. No new GM crops have been commercialised for several years.

In the face of a set of competing pressures and interests pulling them in different directions, Chinese officials appear to be taking a 'wait and see' position (see box).

Under some circumstances, a 'developmental state' can challenge the major biotechnology multinationals, as the Chinese case suggests. This could mean that technology is more relevant to a greater range of farmers, with less emphasis on proprietary products, where profits can be captured for corporations, and with greater emphasis on exploration of a range of non-transgenic biotechnology tools. However, questions still need to be asked. One dilemma for the developmental state is that rapidly developing technological capacity may not always allow sufficient space for careful deliberation of the risks associated with new innovations, or what forms of development are most appropriate for poor farmers. Added to this, China is clearly different from many other states in terms of its size, its political and organisational culture, and the scale of resources it can put behind its biotechnology programme. Not all developing countries can guide the path of technology development in quite this way.

This briefing was written by James Keeley (IDS). It is based on papers 1 - 4 and 33 (see publications list). These are available at: **www.ids.ac.uk/biotech**

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