Can Agricultural Biotechnology be Pro-Poor?

A Sceptical Look at the Emerging 'Consensus'

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A recent well-publicised book, by the director-general of the International Food Policy Research Institute (IFPRI) and World Food Prize winner, Per Pinstrup-Andersen, opens with a story. The story is one of a 'skinny three-year-old girl' who 'lay dying on a mat, surrounded by crying relatives' in a village in south-western Zimbabwe during the summer of 1999.[1] The imagery is powerful, the story familiar from media reports of famine in Africa and the conclusion (to what is promoted as a 'balanced' and 'unemotional' perspective[2]) clear: if well harnessed, agricultural biotechnology can solve the problems of famine and hunger in sub-Saharan Africa and South Asia.

The argument of this book – and a whole swathe of other recent publications from reputable and well networked organisations – whether the CG[3] centres like IFPRI, national science academies, the OECD, the Rockefeller Foundation or the World Bank[4] – is simple. With growing populations and declines in yield growth of basic food crops in the post-Green Revolution era, increasing yield growth is essential. New biotechnological applications, and in particular transgenics, are important parts of the way forward. This is portrayed by some as perhaps the only feasible ethical standpoint for the international community. Pinstrup-Andersen again notes:

> If technological development bypasses poor people, opportunities for reducing poverty, food insecurity, child malnutrition and natural resource degradation will be missed, and the productivity gap between developing and developed country agriculture will widen. Such an outcome would be unethical indeed (Pinstrup-Andersen and Cohen 2000: 22).

The core justification for this increasingly influential position is essentially neo-Malthusian in character. Production (and to some extent nutritional improvement) is the key, and redistribution/access issues, while important, are infeasible to implement. For example, the highly influential Nuffield report rejects the option of redistribution, and argues for a focused technological solution to create a pro-poor biotech:

> Political difficulties of redistribution within, let alone among, countries are huge. Logistical problems and costs of food distribution also

> militate against sole reliance on redistributing income (i.e. demand for food) to meet present, let alone future, needs arising from increasing populations in less developed countries. Hence we must stress the importance of any new options that will secure higher direct and indirect employment and cheap food in labour-surplus developing countries....What is required is a major increase in support for GM crop research and outreach directed at employment-intensive production of food staples within developing countries (Nuffield Council on Bioethics 1999: 4.8, 4.10).

For the biotech advocates, then, population pressure is the core factor, the Green Revolution is the model solution, while a focused, biotech 'Gene Revolution' is the future. The FAO's biotech policy statement follows this now frequently repeated line:

> Agriculture is expected to feed an increasing human population, forecast to reach 8,000 million by 2020, of whom 6,700 million will be in the developing countries. Although the rate of population growth is steadily decreasing, the increase in absolute numbers of people to be fed may be such that the carrying capacity of agricultural lands could soon be reached given current technology. New technologies, such as biotechnologies, if properly focused, offer a responsible way to enhance agricultural productivity now and for the future... (FAO 2000, para. 1).

This 'feeding a hungry world' narrative is reflected in the justifications for most policy positions of core international organisations (and in much biotech industry publicity materials besides). How are these positions justified? A recent flurry of increasingly sophisticated – but inevitably assumption laden – models have rekindled a policy focus on food security issues, and an emphasis on the need to increase agricultural production for growing populations. This has been further fuelled by debates about the implication of new trade regimes under the WTO. These discussions have firmly re-established the centrality of *global* food security issues in international policy discourse – with scenario models, production gap predictions and Malthusian overtones surprisingly reminiscent of the debates in the 1970s.

For example, the influential report on 'World Food Prospects' (again produced by IFPRI) argues that, due to increasing populations, growing urbanisation, and rising incomes, there will be a 40 per cent escalation of demand for cereals up to 2020 (Pinstrup-Andersen *et al.* 1999). A growing demand for meat is resulting in a 'livestock revolution' which will require increasing volumes of grain as fodder. In order to meet this demand, yield increases are essential, as cultivated areas are only expected to rise by a fifth. With trends in yield growth predicted to continue downwards, this will require a doubling of imports of grains to the developing world. Projected population increases are concentrated in Asia, with India and China accounting for a third of the estimated growth to 2020. In the model, China is forecast to account for a quarter of global increases in demand for cereals, and two-fifths of the increased demand for meat. Although population growth is not likely to be as significant in Africa (especially given the HIV/AIDS pandemic), and there remain opportunities for increasing production through expansions of cultivated area, sub-Saharan Africa is the region least able to deal with the consequences of declining yield growth and the prospects for increasing world food prices, especially given the declining availability of food aid. For IFPRI and others, agricultural biotechnology is seen as a potentially neat, technical, science-based, apparently apolitical solution to this unfolding scenario.

But what is the likelihood of such an outcome? Will technological solutions deliver real benefits to the poor, and so eliminate hunger and famine? Is the science up to it? Are the political and economic conditions right? Are there enough public resources available? Will the private sector play ball? Are there other solutions that might deliver similar – or even better – returns to the undeniably important issue of raising agricultural production if given the support? In what was otherwise a report very supportive of biotech, the Nuffield Council sounded a helpful note of caution:

> As GM crop research is organised at present, the following worst case scenario is all too likely: slow progress in those GM crops that enable poor countries to be self-sufficient in food; advances directed at crop quality or management

Box 1: Ten key (sometimes hidden) assumptions of the pro-poor biotech advocates

- The priority for tackling poverty and food insecurity needs to be through focused technological transfer to support agricultural development, rather than broader institutional reforms and livelihood responses.

- Declining yield growth in the major food crops is the key factor affecting food insecurity and both chronic and acute famine. Access/market/distribution/security/conflict issues, while important, are secondary and more difficult to deal with because of their complexity.

- Modern biotechnology can deliver the solutions to key agricultural constraints affecting poor people, including resistance to pests and diseases, salt and drought tolerance and yield improvements in crops that have not responded to conventional breeding. Public research efforts will be focused on those crops and traits that the private sector will not touch. Research will in turn result in some significant breakthroughs on a par with the breeding efforts of the Green Revolution era.

- The resulting products will be acceptable to farmers because they will provide improved returns, both reducing costs and providing tangible benefits. Farmers and consumers will become accustomed to the new products as they have with other earlier technologies, such as hybrids and new foods. Public education will be key in this regard.

- Biotechnology options offer more cost-effective and sustainable solutions to key agricultural problems than more conventional, lower tech solutions. The diversion of limited research funds to biotech will pay dividends in the longer run, and is a better bet than spending scarce resources on 'sustainable agriculture' or 'low external input' options.

- Major increases in international public research funds will be available for both basic and applied research in high-end biotechnology. This will result in well-equipped labs staffed by highly qualified scientists in both the international and national agricultural research systems in the developing world.

- Intellectual property issues will be dealt with through 'public-private partnerships' modelled on the Vitamin-A rice deal brokered by the Rockefeller Foundation. Private companies with proprietary rights over key genes or processes will give these up for public good research and development on 'orphan' crops and 'difficult' traits, with no strings attached.

- The private sector will deliver biotech solutions to developing countries suited to local needs in areas where returns are guaranteed. This might include high value crops (e.g. horticulture), cash crops (e.g. cotton) and crops where hybrids are well established (e.g. maize). Liberalised, competitive global markets will encourage low prices and the best technology being delivered. The associated technology fees applied will not prevent smaller farmers reaping the benefits of the new globalised agri-food system.

- Food and biosafety issues will not be a major issue in the promotion of biotechnology. Transgenic products are essentially 'substantially equivalent', and in many cases the introduction of new crops will be a familiar process, not significantly different from traditional plant breeding. Problems of antibiotic markers and potential resistance will be ironed out in time through scientific developments.

- Regulatory issues will be dealt with throughout the world by international 'capacity building' efforts in developing standardised, harmonised regulations for the agricultural biotechnology sector. With new regulations in place these will be enforced consistently and effectively throughout the developing world.

> rather than drought tolerance or yield enhancement; emphasis on innovations that save labour costs (for example, herbicide tolerance), rather than those which create productive employment; major yield-enhancing progress in developed countries to produce, or substitute for GM crops now imported (in conventional non-GM) form from poor countries (Nuffield Council on Bioethics 1999: 4.23).

Similar issues are raised in the 'Seven Academies' report:

> Current industrial biotechnology is primarily oriented to the needs of large-scale commercial agriculture, rather than to those of the subsistence farmer. Most developing countries lack the financial resources and are limited in the scientific infrastructure needed to develop their own biotechnology programmes for the crops that are important to feed their people. The long-term decline of public agricultural research, the increasing privatisation of GM technologies, and the growing emphasis on the crops and priorities of the industrialised nations do not bode well for feeding the increasing populations of the developing world...without changed incentives for sharing access to GM technologies, the world is unlikely to direct much of its research for improved nutrition and employment-based access to staples for the poor (Royal Society *et al*. 2000, Ch 7).

So what are the advocates of a pro-poor biotechnology assuming when they argue for the importance of seeing agricultural biotechnology as the solution to global famine problems? In the writings of IFPRI and others, these assumptions are often well hidden, so keen are they, it appears, to make the case for biotech. But for a more fulsome and balanced debate we need to identify the assumptions, and interrogate them, testing them against our knowledge of particular places, contexts and economic and policy trajectories.

Box 1 identifies ten key assumptions, each of which need thorough and urgent discussion. If the assumptions stand up, then the argument for pro-poor biotechnology should be supported. If they don't, then we must be more cautious, and think hard about alternatives, but also begin to tackle more fundamental (often difficult, controversial and political) issues which may stand in the way of the realisation of pro-poor biotech options. Sadly many of these assumptions are currently not being debated in the fora that dominate international biotechnology policy-making. The influential players tend to take an optimistic view of technology potentials and downplay the difficulties presented by the political economy of biotechnology, with talk of 'win-win' solutions, public-private partnerships, and capacity building to improve regulatory efficacy.

Yet in other fora, conventionally excluded from mainstream decision-making, debates may be framed quite differently. Here concerns are raised about corporate control of agriculture, changing livelihood opportunities, the dominance of intellectual property ownership by a few, and the uncertainties inherent in regulatory science. Unfortunately the biotech debate has become exceptionally polarised, with positions becoming entrenched around both global and national struggles for positions (Stone 2002). This scenario – provoked and reinforced by the fierce controversy particularly in Europe, and the advocacy positions of corporates, governments, and NGOs – has perhaps undermined the quality and depth of the debate about what type of rural future is wanted in different (highly context-specific) parts of the world, what type of agriculture improves livelihoods and reduces vulnerabilities, and what form of regulation responds to both scientific uncertainties and public disquiet.

There are, however, some experiments emerging which offer insights as to how a different type of policy deliberation might occur, where alternative perspectives and different framings of the debate have a place (Holmes and Scoones 2000). In the few examples that have been convened in the developing world around biotechnology, there have been concerted and often heated debates about the assumptions listed in Box 1. For example, in citizen juries in India, poor rural producers have asked – drawing on their own experience and their own worldviews – many searching questions about the impacts of a biotech revolution, as currently conceived, on livelihood choices and options (Pimbert and Wakeford 2002; Wakeford 2000).

While inevitably imperfect and only experimental at this stage, such deliberative policy processes offer one route for encouraging a challenging of assumptions by those who are currently excluded from the mainstream policy debate.

Critics sceptical about the future of agricultural biotechnologies in meeting food security needs and preventing famine regard meeting all (or even some) of these assumptions as highly unlikely. Even accepting the importance of taking a twin-track approach – acknowledging that production is important, as well as access and distribution – they question the likelihood of biotech science delivering the type of products that would make a big difference in the medium or even long term. Even if the science was up to it, a variety of other factors, which make a pro-poor biotech unlikely, are pointed to. Among these are: the limited availability of public funds (and the low likelihood of a sudden flood arriving soon); the complications of intellectual property arrangements, and the aggressive insistence of the private sector majors in holding on to their proprietary rights; and constraints associated with the way the agri-food industry is increasingly organised around a limited number of multinational companies.

The most likely scenario, they argue, is more or less the 'worst case' one identified by the Nuffield report, one that results in an increasing domination of the agriculture sector by the 'big six' multinationals, and the promotion of biotech products, which will have potential only among better off farmers in the higher resource endowment areas. The limited publicly supported, pro-poor technologies will be cast-offs, or public relations stunts, and will not make significant impacts on poverty and hunger, they claim.

However, all is not rosy on the other side of the fence either. The critics, in turn, must assume that the development of alternative technologies can result in the necessary returns (in terms of production, risk reduction, etc.) to increase food security, over areas far larger than the relatively isolated case examples documented to date. They must also assume that policies for local, national and international redistribution of food will take place, in contexts where governments are weak, and trends towards liberalisation and reduced government intervention are ongoing, and being reinforced by international agreements on trade and aid conditionalities by donors.

The debate is still ongoing. However, the emerging mainstream 'consensus' position on 'pro-poor biotechnology' is far from established. If poor people are to benefit from biotechnology applications, then some fairly far-reaching issues of politics and political economy in the agri-food sector will need to be addressed head on. With the current cosy talk of win-win solutions, couched in a swathe of assumptions, this is unlikely to happen without a major redefinition of the parameters of – and, crucially, participants in – the debate.

The current technicised style of discussion, sidelining the difficult issues of politics, control and power, may, in the long term, actually undermine the capacity of poor people to benefit from these new technologies, which potentially have so much promise. But we should not be deceived by the promises of the future, while the *realpolitik* of the present needs to be dealt with. While there are undoubtedly some examples where biotech applications have benefited poor people already – and there may well be more in the future, if the science optimists are to be believed – the more strategic, yet often unasked, question for the international research and policy community must remain: is this the right track – if the core objective is reducing poverty and preventing famine – and if it is deemed at least a partial best bet, what is being missed out by pursuing it? The answer to this remains far from clear.

Notes

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1. Pinstrup-Andersen, P. and Schioler, E., 2001. The quote is from the opening page.
2. See the commendations from Lester Brown from the Worldwatch Institute and Gordon Conway, President of the Rockefeller Foundation.
3. Consultative Group on International Agricultural Research.
4. See, for example: World Bank (Kendall *et al.* 1997); CGIAR/National Academy of Science 1999; OECD 2000; Royal Society, *et al.* 2000; Conway 1999.

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