

# The industry strikes back

## Functional foods: good for Monsanto's health

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### Executive summary

- A new 'second generation' of GM crops is being developed, consisting of crops that have been genetically modified to express traits delivering apparent benefits to the consumer – unlike, as with the 'first generation', delivering only producer benefits.
- 'Functional foods' are part of this so-called 'second generation'. The industry hopes this will be the way to introduce genetically modified products on to the market, and to get around the worldwide resistance that has so far prevented their success.
- With 'wonder crops', such as vitamin A 'golden rice', these new foods are being hailed as a panacea for poor people around the world – even though they have yet to be proven in work outside laboratories, and carry all the incipient risks inherent in first generation GM products.
- In any case, the vast majority of current corporate research is not dedicated to crops appropriate for developing countries, but is instead aimed at creating products targeted at consumers in rich countries. Examples of such products are vegetables and fruits with "improved" taste, longer shelf-life, and healthier fats.
- Research on 'wonder crops' is conducted almost solely by a small number of publicly-funded institutions, rather than in corporate laboratories. However, the biotech industry has been quick to use them in public relations campaigns aimed at gaining acceptance for GM generally, and for pushing their own products on to the market.

### Introduction

"Those of us in industry can take comfort of a sort from such obvious Luddism. After all, we're the technical experts. We know we're right. The 'antis' obviously don't really understand the science, and are just as obviously pushing a hidden agenda – probably to destroy capitalism." (Robert Shapiro, CEO of Monsanto).<sup>1</sup>

The biotech industry's aim to dominate world food markets has come unstuck in many places around the globe. Despite claims that biotechnology will feed the starving and lead to more environmentally friendly ways of growing food, huge protests around the world have shaken the industry to the core. Thrown onto the defensive when the GM furor erupted, the industry has been forced to come up with a new strategy to try to get consumers to accept genetically manipulated products.

Its answer, the 'second generation' of GM crops, is 'functional foods'.

Functional foods are already a widespread, although comparatively recent, trend in the European food market. While still a new direction for genetic modification, you can find many non-GM functional food products lining shop shelves already, ranging from chocolate bars to spreads, cereals and yoghurt.<sup>2</sup> The main novelty for these functional foods is their claimed health benefits. That many food products can be beneficial for your health isn't new. And that certain products are healthier than others isn't new either – after all, 'light' and 'diet' versions of diverse products have been around for years. But what is new with many of these functional foods is that either they contain additives which – it is claimed – give them totally new (nutritional) qualities, or that the manufacturer has completely eliminated certain qualities from the food, such as allergenic proteins, thus making it seem more healthy.<sup>3</sup>

Functional food products already on the market include examples where the product has vitamins added, or where an allegedly more healthy form of fat is used in the food manufacturing process. Thus, much of the functional food already on the market is processed food, where the extra 'function' is added during the processing, and not – as yet – through genetic manipulation.

However, biotechnology is increasingly being applied in order to deliver the perceived consumer benefit inherent in the functional foods trend. The industry claims that in the future humanity will benefit as vitamins are bred into basic crop staples in Third World countries to stave off vitamin deficiencies – especially in children.<sup>4</sup> Other promised novelties include tomatoes that contain "cancer-fighting substances", or allergen-free peanuts.<sup>5</sup> Another much-vaunted possibility is for vaccines to be bred into fruits like bananas to tackle common diseases like Hepatitis B.<sup>6</sup>

Biotechnology, the industry alleges, could hold the key to solving many of the world's most intractable health problems. At the same time, it is claimed, the technology could also liberate people from having to take drugs in pill or vaccine form.<sup>7</sup> However, there is no clear definition of the term 'functional foods', so confusion reigns throughout the industry as to what the phrase really means.<sup>8</sup> Several other related terms are also being kicked about, including 'nutraceuticals' and 'medical foods', with 'output traits' being added to products through 'value-added' biotechnology. This report will not try to define 'functional foods' any further, but instead uses it as a broad description for products that have a (claimed) consumer benefit – ranging from taste to nutritional value, or for food as a carrier of medicine.

## Beyond the PR – the reality of the research

When one ventures beyond the headlines, much of the research actually going on is not particularly spectacular or groundbreaking. Nor are there very many products that have actually been brought to market. Examples of these are oils that are manipulated so that they contain allegedly more healthy fats, or fruits and vegetables that stay ripe longer on the shelf, thus (according to the industry, that is) delivering a "superior taste".<sup>9</sup> But so far GM functional foods are very few, Peter Kearns (head of OECD Task Force on Safety of Novel Foods and Feeds, and Working Group on Harmonization and Regulation of Biotechnology) states.<sup>10</sup>

Most of the spectacular products – the ones that get media attention and which are promised as a solution to world hunger – are not researched by the big corporations, but by public institutions.<sup>11</sup> But it is the commercial sector of the biotech industry that stands to gain from the good PR these public institutions' research generates in mainstream media. For example, as the US industry organisation BIO trumpets on its website: "It will be possible to grow and distribute the foods containing edible vaccines locally at relatively low cost."<sup>12</sup> BIO's president, Carl Feldbaum, took up the theme in a speech at the BIO 2000 conference: "Our industry is also making enormous progress in agriculture; creating more nutritious foods and helping farmers grow crops with less pesticides and less disruption of the environment. An example is what's been called golden rice, which contains enhanced levels of vitamin A and iron to fight night blindness in children, and anemia in adults. Developments such as golden rice will have the most immediate impact on nations struggling to improve their people's health and to create the economic and political stability needed for prosperity."<sup>13</sup>

Another important player internationally has been CGIAR (Consultative Group on International Agricultural Research), a network of academics which is very influential in the international research being done in the area of agriculture. The UN's Food and Agriculture Organisation and the World Bank also play a big role, and aim to increase their participation in the future.<sup>14</sup> Public institutions are leading technological developments, as Peggy Lemaux, of the Department of Plant and Microbial Biology at the University of California, explains: "As for public institutions, I think we started in earnest on this earlier than companies. They were busy with Bt and herbicide tolerant crops."<sup>15</sup>

In addition, many of the products still languish in the conceptual stage. Lemaux estimates that it will take many years before any of the more hyped crops bring their promised benefits to the marketplace.<sup>16</sup> The OECD's Peter Kearns is still more sceptical – believing that it will take up to a decade for new products to be produced commercially. And that's only if they are not "disturbed", he adds.<sup>17</sup>

## The big biotech companies

It isn't easy to know what the companies are doing, since their research stays secret in order that patents can be obtained to protect new products. This list is therefore probably far from comprehensive, but should be seen as just an early attempt to profile the current state of developments within the industry.

### Monsanto

Monsanto has for a long time been the producer of the much-criticised "health" sweetener NutraSweet, but the main focus of its biotech work has been aimed at conferring herbicide resistance on patented seeds (such as 'Roundup Ready' crops). But, says the company, it is not the only beneficiary of its work: "Now and in the near future, the products of food biotechnology provide food quality improvements which include better taste and healthier foods."<sup>18</sup> It is only quite recently that Monsanto began working on crops with 'output traits', supposedly delivering benefits to the consumer. Examples so far developed include high-stearate soy oil, which the company claims will be healthier in margarines and shortenings, and which are expected to be released onto the market this year.<sup>19</sup> Other products coming within the next two years are 'healthier' vegetable fats and high-oil corn for animal feeds.<sup>20</sup> Still further in the future (somewhere between 2002 and 2006) Monsanto intends to release a 'higher-solids' potato which will absorb less oil during processing – resulting in "better-tasting french fries" or chips and crisps. Bruise-free potatoes, without those nasty black spots, is another of Monsanto's planned releases by 2006, as is nutritionally-improved canola (oilseed rape), soy and wheat, and soybeans with improved taste.<sup>21</sup> The company will also start producing a tomato with higher sweetness, through its subsidiary Calgene.<sup>22</sup>

Monsanto has also been developing a high beta-carotene mustard plant, which it has offered to give to poor farmers around the world free of charge. This plant, the company claims, will alleviate vitamin A deficiency in much the same way as the so-called 'golden rice' (see more below). But the donation seems to be more about giving Monsanto and biotechnology a better reputation than any indication of any real desire to help undernourished children, and is more a happy accident of other research than a result of any conscious effort by the company. In addition, there are many questions still unanswered with regard to the use of the technology – nobody knows if the mustard plants will have any of the claimed benefits at all, or whether they will actually survive in the fields.<sup>23</sup>

### Novartis

"We at Novartis Consumer Health are committed to becoming a world leader in the understanding and fulfilment of consumer self-care, health and medical nutrition needs. ...We aim to achieve that goal through the provision of the highest-quality, proven, products and brands within the over-the-counter health and functional

foods and medical nutrition arenas."<sup>24</sup>

"Novartis is dedicated to innovation and to developing new technologies and products that promote healthy crops and livestock, and ensure a nourishing food supply for the future."<sup>25</sup>

In practice, Novartis Seeds is trying to genetically modify crops to contain healthier oils, as well as trying to improve the flavour and shelf-life of vegetables.<sup>26</sup> So far the main focus has been on developing GM livestock feed. Novartis is already marketing high-oil hybrids, and corn with higher digestibility for dairy animals. "Products in our pipeline include plants with modified oil contents, higher lysine levels, lower phytate levels and modified starches", explains Jim Beck, market development manager at Novartis Seeds.<sup>27</sup> Furthermore: "In the not so distant future, we're going to manufacture compounds that plants can't produce on their own," such as pharmaceuticals, nutritional and industrial compounds, predicts Dr. Jeff Rosichan, head of applied biotechnology research.<sup>28</sup>

Novartis is also the world's leader in the (non-GM) functional foods industry. Its functional foods department – with brand names such as Cereal, Gerble, Ovaltine and Isostar – has an annual turnover of about \$2.4 billion, almost double that of its closest competitor in the area.<sup>29</sup> Late last year Novartis launched the new brand name Aviva, solely focused on selling different 'healthy' functional foods.<sup>30</sup> Ironically, Novartis clearly states on the website dedicated to the new brand that it doesn't include any genetically modified ingredients.<sup>31</sup> In February this year Novartis and Quaker Oats announced a new joint venture in the functional foods sector. The company is called Altus Food Co, and will probably have its first products on the market next year. "Our plans are very aggressive. We've got some very exciting products and projects already near completion", says Greg Shearson, head of the new company. But it refuses to disclose any more concrete information on what's in the works.<sup>32</sup>

That Novartis clearly state that their new brand Aviva doesn't include any GMOs is hardly reassuring. According to the Financial Times, Dr Daniel Vasella (chairman and CEO of Novartis) "believes that tangible consumer benefits could turn the debate on genetically modified foods."<sup>33</sup>

### **DuPont & Pioneer Hi-Bred**

These two companies have a joint venture called Optimum Quality Grains, LLC. They already produce several (non-GM) soybean oils, such as LoSatSoy<sup>®</sup>, which they claim are more healthy because they have lower levels of trans-fatty acids.<sup>34</sup> These products are then used for example in products by DuPont subsidiary Protein Technologies International (PTI), one of the world's largest suppliers of soy.<sup>35</sup> The joint venture and the acquisition of PTI "are important steps in our life sciences strategy to grow in the global food, feed and industrial markets with higher value products derived through biotechnology", says Bill Kirk, vice president of DuPont Agricultural Enterprise. He continues: "We have the most

complete pipeline to move ingredients from the farmer all the way to the ultimate consumer; no other company can do that while bringing value to each segment of the agribusiness market."<sup>36</sup> Current biotechnology innovations include research into better-tasting soy, which the company claims will benefit consumers and growers – especially in the developing world.<sup>37</sup> DuPont has also bought Cereal Derived Functional Ingredients (CDFI) from Dalgety plc, to further enhance the area of functional foods. This company specialises in wheat products (for example for soups, ice creams and vegetarian food), and the deal included the company's R&D capabilities.<sup>38</sup>

### **Aventis**

"In the future, only a few companies will be able to shape the developments in this [the biotechnology] industry - Aventis CropScience [...] will be one of them," Jürgen Dormann, chairman of Aventis, stated at a recent annual meeting of the company.<sup>39</sup> This strategy, claims the Aventis website, will partly be carried out using functional foods: "We are also investing in innovative solutions designed to enhance the quality of the foodstuffs produced, an aspect gaining in importance."<sup>40</sup>

In the company's publication 'Biotechnology and the Challenge of Caring for a Growing World Population' Aventis claims that its research conducted to improve the quality of food will also help alleviate nutritional problems in the world, and that some products are already close to reaching the market.<sup>41</sup>

Together with the company Agritope (a subsidiary of the pharmaceutical company Epitepe) it operates a joint venture called Agrinomics LLC. Agrinomics was formed in July 1999 to "identify, develop and commercialize novel genes", for example genes that "confer desirable traits in certain vegetables", such as improved nutritional qualities.<sup>42</sup> "This alliance provides a meaningful commercial outlet for any new vegetable varieties developed from the expected discoveries", said Adolph Ferro, CEO of both Agrinomics and Agritope.<sup>43</sup> The joint venture has so far been developing slow-ripening melons, tomatoes and raspberries – the products are currently undergoing field trials.<sup>44</sup>

### **AstraZeneca**

AstraZeneca is one of the leading companies in the agbiotech sector. It was also the first company to introduce a GM product in Europe, a modified tomato sold as puree.<sup>45</sup> "We believe this market will grow substantially and consequently we continue to invest considerable resources in this area of our business," says the company.<sup>46</sup> Like Novartis and Monsanto, AstraZeneca also focuses on the "nutrition enhancement" of crops.<sup>47</sup> Through its subsidiary Zeneca Plant Science, it is now developing a tomato for longer shelf-life (and supposedly therefore better taste), which will probably reach the market within a couple of years.<sup>48</sup>

### **Dow Chemical**

Dow is one of the world's largest chemical companies,

with a not-so-bright track record of producing highly toxic chemicals. It has also started to shift investment into the agricultural biotech sector, through subsidiary Dow Agrosciences. "The goal of our biotechnology activity is to capture value for Dow and its shareholders. We'll do that through seed sales, trait marketing and value-added grain alliances," says Mr. Stavropoulos, CEO and president of Dow.<sup>49</sup> Examples of the value supposedly added for the benefit of the consumer are oil and starch modification in plants.<sup>50</sup> Through its subsidiary Mycogen, Dow produces a high oleic sunflower (called NuSun), which is low in trans-fatty acids, and delivers better "temperature stability", which Dow claim makes for healthier use as a cooking oil.<sup>51</sup> Corn with increased starch levels is currently being developed.<sup>52</sup>

**Savia**

Alfonso Roma, president of ELM (which later merged into Savia), last year predicted that within a decade 80% of all fruit and vegetables would be genetically modified.<sup>53</sup> And Roma is in a position to make his prediction come true. Savia is the world's leader in vegetable and fruit seeds, and is involved in biotechnology (including functional foods) through its subsidiary Bionova Holding Corporation (earlier called DNAP Holding Corporation).<sup>54</sup> Bionova claims that it is providing a "healthier life for everyone", by developing "superior fruits and vegetables with enhanced nutritious and disease-preventing properties".<sup>55</sup> It already produces a series of GM crops called FreshWorld Farms®, which according to the company have a superior taste and colour due to the effect of genetic manipulation prolonging ripening time (and thus shelf-life of the product). Examples already on the market are FreshWorld Farms Endless Summer® Tomato, FreshWorld Farms® Sweet Mini-Peppers and FreshWorld Farms® Cherry Tomatoes. The company will soon also start producing sweeter peppers, as research is now at field evaluation.<sup>56</sup>

**Feeding the poor?**

As stated before, almost all the PR blitz currently surrounding biotechnology is centred around expectations that it could help alleviate malnutrition in the Third World. But most research being done in the area is conducted by public institutions around the world - not the big corporations. Although there are many institutions conducting research in plant biotechnology, not many have yet entered the area of functional foods. The following list details some of the more important ones that have.

**ETH, Switzerland**

One of the most widely trumpeted breakthroughs in the area was when ETH, the federal Swiss Institute of Technology, last year reported the creation of a new variety rice enriched with vitamin A and iron (immediately dubbed "golden rice" in many media). The research was funded partly by the Rockefeller Foundation.<sup>57</sup> "People seem happy about GM vaccines.

My claim is that GM rice could bring similar levels of benefit," says Gordon Conway, president of Rockefeller Foundation.<sup>58</sup> The Foundation has already poured hundreds of millions of dollars into this sort of plant biotech research.<sup>59</sup>

However, the rice so far only exists in the laboratory, and it is as yet unclear how it will fare in field trials – especially when tested in different ecosystems and climates. To develop varieties that could actually be grown on a widespread scale in fields around the world (even if this were desirable, which is far from being the case – see below) might take at least another decade, and hundreds of millions of dollars more.<sup>60</sup> The researchers have patented the new rice, but claim to have done so only to stop someone less scrupulous from stealing the invention. The Institute claims that its ultimate objective is to give 'golden rice' away free to the world's poor. Whether this actually will be the case is still an open question, since it is not only ETH and the Rockefeller Foundation who are stakeholders, but also many big corporations – because 'golden rice' uses at least six other processes, for which they hold the patents.<sup>61</sup>

**Cornell University, USA**

At Boyce Thompson Institute, Cornell University, researchers are currently developing a banana that delivers a vaccine against hepatitis. The bananas contain a certain protein which when ingested triggers a response from the immune system similar to conventional vaccines. The research is still at laboratory stage, but the first phases of testing have been carried out.<sup>62</sup> Cornell University's Marc Weksler claimed in a recent speech that: "Edible vaccines and GM foods will cause a healthcare revolution in countries not as well off as my own."<sup>63</sup>

**Loma Linda School of Medicine, USA**

LLSM is working towards the creation of an edible cholera vaccine by adding genes to potatoes. This is also still at laboratory stage.<sup>64</sup>

**University of Nevada, USA**

Researchers at the University of Nevada are trying to develop plant oils (eg soybean oil) that contain increased levels of vitamins, especially vitamin E.<sup>65</sup>

**University of California, Berkeley, USA**

At Berkeley researchers are trying to decrease, and even remove, the allergenicity of food. Animal tests have been conducted on the allergenicity of milk, which according to the researchers proved positive for most of the dogs on which it was tested.<sup>66</sup>

**International Rice Research Institute (IRRI), Philippines**

IRRI has mainly been interested in raising the yields from rice (both through biotech and through traditional methods), which it claims to have done with considerable success. But Gurdev Singh Khush, head of the plant breeding, genetics and biochemistry division, states that

they also are working on consumer benefits – for example rice with higher iron, zinc and vitamin content.<sup>67</sup>

## Problems with functional foods

### 1. False health claims

The first question here is how far the health benefit claims made for these new products actually stand up to scrutiny. In addition, the lack of government regulation has given the companies free rein to make dubious allegations on behalf of their new wonder products. Often statements are made that functional foods will lower cholesterol or prevent cancer – without any strong evidence that this is really the case. In any case, diet and health have a complex relationship. Even if an ingredient in food is healthy, you can still have too much of it. For example, added vitamins could be beneficial to a person suffering from a particular deficiency, but could be detrimental to someone else. The key point remains – that a healthy diet is a balanced diet.

### 2. Misleading overall diet

Another risk is that these new ‘functional foods’ might mislead consumers into switching from a diverse, healthy diet to a basically unhealthy one – with an increasing reliance on ‘functional’ additives or modifications. Many of the products developed so far (e.g. chocolate bars) are in reality very unhealthy foods. For example, even if you add vitamins to a product, it can still contain far too much sugar, fat or other unhealthy ingredients. The trend towards functional foods will also make people more dependent on over-packaged, processed food, instead of cooking their own at home – again threatening overall health. For people in poorer countries, this approach might spell nutritional disaster – if they were to turn from a truly balanced diet, consisting of many different traditional ingredients, to a diet based mainly on new ‘wonder crops’.

### 3. Distraction of valuable research resources

Hundred of millions of pounds have been poured into research for ‘golden rice’ alone, and much more will be needed before this crop stands a chance of becoming widely available. Much of this is cash that could be put into true sustainable development – promoting locally appropriate and ecologically benign agriculture.

### 4. Accessibility

Wild claims are made on behalf of these new crops – that they are going to save the world’s poor, preventing vitamin-deficient children from going blind. But most of the crops will not be accessible for those who would need them, since they will be too expensive for poor people to buy. The corporations are motivated by profits, and by the monopoly control conferred by the patents system – not by charity. And having spent vast sums in research, even progressive companies can ill-afford to give their new products away. In some cases (e.g. ‘golden rice’), statements that new products will be given away free may well prove to be empty promises.

### 5. Power to big companies.

Even if people could afford the crops, widespread adoption would simply lead to an even bigger dependence on the companies providing them. Instead of relying on traditional modes of diverse and self-sufficient production, farmers are being persuaded to turn to new ‘wonder crops’ and throw away centuries of experience. This in turn will serve to concentrate power still further in the hands of a few giant multinational corporations. And since many of the crops are not adapted to local conditions in the same way as traditional, local varieties, they are more reliant on fertilizers and pesticides – increasing the dependence on big corporations and intensifying a destructive form of chemical agriculture. The world’s food supply is already being concentrated in fewer and fewer hands at an alarming speed. The likely outcome of the widespread adoption of GM crops remains a nightmare scenario of a few corporations controlling the whole world’s food supply.

### 6. Technical fixes avoid the real problem

The new crops are another example of attempts to develop technical fixes to what in reality are political questions. The exaggerated claims (“we’ll feed the world”) accompanying the ‘second generation’ of GM crops are not new – they first surfaced when herbicide resistant strains were brought to market several years ago. In reality, the big problem facing the world’s poor is not that there is an absolute food deficiency, but that they can not afford to buy the food that is available, and they do not have any land of their own to grow food on. Thus the technical fixes serve to divert attention from real problems of starving people – poverty, injustice, a lack of land and other resources. And ironically, the intensification of corporate control that GM crops promise will only make this problem worse.

### 7. Exacerbates problems from Green Revolution

Proponents often refer to GM crops as a second Green Revolution, promising to deliver higher yields and support growing populations. But the supposed overall benefits of the first Green Revolution are far from clear. Switching from diversity to monoculture has turned farms the world over into wildlife deserts, poisoning water supplies and destroying wildlife. GM crops – with their emphasis on global supply lines and giant corporations – will destroy local capacities to develop food security and intensify the concentration of land ownership, as the Green Revolution did before them. Much of the biological diversity of the world’s farming has now been lost – increasing the reliance of billions of people on a narrow set of food staples with a rapidly shrinking gene pool. When monocultures fail, the results for food security can be truly catastrophic – leading to famine and starvation.

### What future for the biotech industry?

Stung by heavy criticism, many of the big corporations in the biotech sector have started to look for new ways of marketing their products and overriding consumer

concerns. The goal has been that of "putting a human face on biotechnology", as a United States senate summit called it.<sup>68</sup> The nutritional departments of the companies have accordingly become the main venues for this latest strategy, and many new acquisitions and joint ventures have taken place in the field during the last few years.

Functional foods are part of what is often referred to as the 'second generation' of biotechnology, delivering a supposed benefit for the consumer rather than the producer.<sup>69</sup> The term 'consumer' can also include companies who buy biotech inputs for their products. For example, 'improvements' in plants that produce industrial oils or biodegradable plastics are also part of the 'second generation' of biotechnology.<sup>70</sup>

The industry has high hopes for these products. According to the Financial Times, Dr Daniel Vasella (chairman and CEO of Novartis), "believes that tangible consumer benefits could turn the debate on genetically modified foods."<sup>71</sup> Peggy Lemaux from UC-Berkeley, USA, believes that genetic engineering of functional foods will be the area of greatest activity for the private companies, since here it is easy for consumers to see a benefit.<sup>72</sup> And the companies will keep on innovating, she claims: "Strategies for creating the new foods will be improved and refined, just as the computer evolved from a machine that took up city blocks to one that fits on your wrist."<sup>73</sup>

This is a view shared by Sir Robert May, the UK government's chief scientific adviser on these issues, who stated (at the OECD conference on GM food safety, in Edinburgh 28th February – 1 March 2000) that a "second generation of GM products was needed that would provide something that the public wanted."<sup>74</sup> The two (unnamed) rapporteurs from the same OECD conference also believe that this might be a way forward for GM. They state that since there is a trade-off between the benefits and risks of any new technique, and that GM has so far failed to deliver tangible benefits for the consumer, consumers have naturally been negative towards it. This might change with these new output traits.<sup>75</sup> This is a theme continued by the OECD's Peter Kearns. He argues that biotechnology has an enormous – indeed revolutionary – potential, and that functional foods are certainly one of the possible applications. According to Kearns, functional foods will be important in the future, and will probably form an essential part of the biotechnology's 'second generation'. But he is wary about making predictions, he adds, because "normally my predictions are wrong".<sup>76</sup>

## **Conclusions**

The biotech industry envisages the development and commercialisation of a 'second generation' of GM crops, starting with functional foods, as a possible strategy to engineer the public acceptance of GM in markets both in the North and the South. By focusing on perceived benefits for the consumer, rather than exclusively for the producer, the industry expects resistance to GM crops in rich countries to eventually melt away. And, more subtly,

the industry and supporters in the public sector are aiming to create a more favourable impression of biotechnology in general by focusing on potential benefits to starving people in the Third World. It is likely that the rush of press stories and apparently exciting new developments in this area are aimed as much at Northern consumers as at Southern underconsumers.

Most of the products of this research are still only beginning to reach the market, but there are large numbers in the pipeline. However, most 'wonder crops', such as the famous vitamin A 'golden rice', are still only at laboratory level, with many years of research and funding needed before any clear judgement can be made as to their effectiveness.

The products that are closest to market are mainly about making basically unhealthy food (such as chips and crisps) a little bit healthier, and these are clearly targeted at consumers in rich countries. But even if they were to work as is claimed in the corporate PR, these foods are in reality completely unnecessary when judged against the benefits of a truly healthy and balanced diet. Instead, by convincing consumers that unhealthy, fatty foods are nutritious, these new crops might instead lead to a deterioration in people's health.

So will functional foods alleviate many nutritional problems in poorer countries? The simple answer is no. Most of the research, and almost all the research that the companies are doing, is in reality targeted at rich consumers. This ought to come as no surprise – after all, a company's primary aim is profit, and consumers in poor countries would never be a large enough market for corporations to recoup their investment costs. And if helping the poor was really the issue, then much simpler methods - costing far less money - could in fact be used. Indeed, these new 'wonder crops' might actually worsen the situation in many countries, leading to reduced biological diversity, deteriorating food safety for the world's poor, and even increased malnutrition.

The argument about saving the poor therefore seems to be little more than just another public relations drive from the industry. Unfortunately, it can not be dismissed so easily. Many publicly-funded researchers – some of them from developing countries, but many also from the rich countries in the North – believe that functional foods can be beneficial. Partly this is due to belief systems - many researchers are highly specialised in what is an incredibly complex field, and it is not surprising that they spend comparatively little time understanding the political bigger picture. This, combined with an old-fashioned view of progress and development – both in the scientific institutions and in other institutions influencing them, such as the World Bank and government bureaucracies – results in a reliance on easy technical fixes rather than attacking the roots of the problems. Politicians and the media also shoulder responsibility in this regard – they ought to see the wider political implications of this approach, rather than blindly trusting what scientists (heavily cheered on by the biotech industry) say.

In conclusion, 'Functional foods', seem certain to be a major way the biotechnology industry attempts to push GM foods onto the market – through slick PR campaigns about saving the poor and increasing consumer health. The important question is this – will consumers buy it?

## Appendix - Liaisons dangereuses

There are many big multinational corporations involved in the functional foods market. Many food companies are interested in the area of functional foods because of the stagnation and slow growth in markets for traditional food. While the ordinary food market grows at about 1-3% annually, the functional foods market has been estimated as growing at 10-15% for the last couple of years.<sup>77</sup>

Analysts differ considerably over how important they believe the market can become – the estimates range from \$10 to \$500 billion.<sup>78</sup>

But not all commentators agree with this bright view of the functional foods industry's future. According to the Financial Times, the story for the sector "has recently been one of flops and scaled-back expectations."<sup>79</sup> And many companies, for example Kellogg's and Campbell's, have already withdrawn products due to failing demand. Burril's Nutraceutical Index, which tracks the share price of 20 US companies in the sector, doesn't hold out any great hope either – in the last year it actually fell by 8 per cent.<sup>80</sup>

Many of the companies involved are not (as yet) using genetic engineering, and instead add additives during processing.

Companies are converging on the functional foods sector both from the pharmaceutical industry and the food industry, either by introducing new brands or by 'repositioning' existing brands with functional enhancements.<sup>81</sup> Some examples are the following:

### Pharmaceuticals<sup>82</sup>

- Abbott Labs (with brands such as Ensure)
- Bristol-Myers Squibb
- Johnson & Johnson
- Otsuka
- Procter & Gamble
- Roche
- SmithKline Beecham (produce different drinks like Lucozade, Ribena and Horlicks)
- Yakult Honsha

### Food<sup>83</sup>

- Archer Daniels Midland
- Campbell Soup Company
- Cargill
- ConAgra
- Danone (dairy products like Actimel and Danone Bio)
- General Mills (breakfast cereals like Cheerios and Fiber One)
- Heinz
- Kelloggs (who produce a whole range of brands, like Ensemble, All-Bran, K-Sentials, Special-K etc)
- Kraft

- Nestle (milk & yoghurt brand LC1 and nutrition formula Nutren)
- Quaker Oats
- Unilever (producers of amongst others Flora, Proactiv and Blue band)

And they are not always working single-handedly. Both Quaker Oats and General Mills have for example stated that they are involved in joint ventures with pharmaceutical companies to "enhance foods and devise products with health benefits".<sup>84</sup> Functional foods therefore represent "a further narrowing of the boundary between the food and pharmaceutical industries", as the analyst firm DataMonitor puts it.<sup>85</sup> And even if most of them today might be free from GM products, there is a great danger that they will go down this road in the future.

### Footnotes

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