

They hailed it as a wonderfood.

Soya not only **destroys forests and small farmers** - it can also be bad for your health

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On a crisp winter morning in Belfast, Dr Lorraine Anderson was nearing the end of her doctorate research project. She had spent weeks hunched over a microscope looking at samples of sperm. Anderson was trying to figure out what made some sperm move slower than others. As a specialist in reproductive medicine at Belfast's Royal Maternity Hospital she was particularly interested in why some samples moved so sluggishly that they would have trouble reaching and fertilising an egg. Anderson knew that a sperm's 'motility' was one of the critical factors in fertility. 'It doesn't matter how many sperm a man's got; if they can't get from A to B then there's little chance of reproduction,' she says.

Anderson's 'eureka' moment arrived when a complex analysis of the samples she was working on revealed that the seminal liquid surrounding the slower-moving sperm contained chemicals called **isoflavones**. These compounds are also known as phyto-oestrogens or plant-oestrogens because they mimic oestrogen, the powerful female hormone.

These highly active compounds are **found in large concentrations in soya**. Indeed such are the doses of these chemicals, **a woman drinking two glasses of soya milk a day over the course of a month will see the timing of her menstrual cycle alter**. It has been estimated that **infants who are fed soya formula exclusively receive an amount of oestrogen equivalent to five birth control pills every day**.

For a growing number of scientists the question is this: if such a

strong biologically active compound is found in soya, what is its effect on humans regularly eating or drinking products made from the bean?

In recent years the food industry has wasted no time in extolling soya's alleged health benefits, claiming it can lower cholesterol, help with menopausal systems, ward off osteoporosis and even reduce the risks of some cancers. However, aside from research linking soya to reduced male fertility, studies now link the phyto-oestrogens found in the plant to an increased risk of other types of cancer. It has also been claimed that it damages brain function in men and causes hidden developmental abnormalities in infants. Some even attribute the early onset of puberty in western women to the spread of soya in diets.

Certainly, Dr Anderson has no doubt about the conclusions of her own research: the more soya a man eats, she believes, the more difficulty he will have in fertilising an egg. Anderson's head of department, Professor Neil McClure, is one of Britain's leading fertility experts and he is already acting on the results. 'If a couple were having trouble conceiving and the man's sperm was a borderline case, then I have seen enough evidence from these studies to advise a change in his diet to minimise soya.'

But this is much easier said than done. Today, soya is no longer just the preserve of the vegetarian or the Asian food junkie but is an invisible ingredient in nearly everything we eat, from pork pies and breakfast cereals to mayonnaise and margarines. Soya is used to 'bulk out' and bind many processed foods, such as sausages, lasagne, beefburgers and chicken nuggets and it allows food firms to claim a higher protein content on the label. Some research estimates that soya is present in more than 70 per cent of all supermarket products and widely used by most fast food chains. The reason for its rapid rise in popularity is that it is both a very cheap source of protein and - when crushed - a source

of high-quality vegetable oil.

No fragment of the bean is wasted. **Even the husk is used as a source of fibre in breads, cereals and snacks.** The oil extracted from soya is the most consumed vegetable oil in the world, and is used in margarines, salad dressings and cooking oils. Food labels will simply list soya oil as vegetable oil.

During the oil extraction, the bean also produces a substance called lecithin. This is a **valuable emulsifier that helps fat mix with water.** It is a critical ingredient of the baking and confectionery worlds, as it prevents ingredients in food from separating. So the food labels of many of our favourite chocolate bars, biscuits and cakes will list **lecithin** as an ingredient without linking it to soya.

Of course, it is not just the 'invisible' market in soya that has enjoyed rapid growth. Soya milk is one of the success stories of the last few years. Sales have rocketed by 20 per cent per annum and it is now one of the fastest growing drinks in the country. Starbucks now offers frothed up soya milk with its cappuccinos and supermarkets have invested in their own brands.

For those who suffer a strong allergic reaction to cow's milk or follow a vegan diet, soya milk has always been an important option. But others drink it as a less fattening alternative to cow's milk. What they don't realise is that **it also gives them an injection of a chemical that mimics oestrogen.** One industry source admitted that the breakthrough for soya milk came when retailers were persuaded to put soya milk into the chilled cabinet, giving it the illusion of being a fresh product. Some soya milk adverts tell the reader to look for it in the fresh food section. In reality, **soya milk is no more than bean juice with some added flavouring to make it more palatable. (does NOT need refrigeration!)**

As well as the growth in popularity of soya products for direct human consumption, some 90 per cent of the 200 million tonnes of soya produced around the world each year is used to feed animals.

Whether it's beef, lamb, bacon or processed chicken, it is highly likely that the meat comes from an animal reared on a diet based on soya meal. In some parts of the world, soya has long been a small part of animal diets, but after the BSE crisis revealed the problems of feeding cattle with animal parts, the soya alternative was taken up with gusto. **So when you eat a piece of meat, the chances are you are also consuming some soya as well.**

Towering proud like a church steeple, the 200ft-tall silver silo in the Argentinian town of Las Lajitas, shines in the South American sun. These huge storage silos, filled with dried soya beans have become the new temples of Argentina. Today's plantation owners listen to a gospel preached by US biotech corporation Monsanto.

Located more than 1,000 miles north west of Buenos Aires and close to the Chilean and Bolivian borders, Las Lajitas is the agricultural capital of a region that has seen untrammelled expansion in soya production. **Where only a few years ago thick native forests filled the landscape, now all that stands between Las Lajitas and the Andes shimmering on the horizon are green pastures sprouting soya.**

Satellite photos of the region show the dramatic change. **Only 15 years ago the area appeared from space as a lush green carpet, now it resembles a threadbare rug covered with the spreading stains of soya plantations.** The figures speak for themselves: in 1971 soya was only farmed on 37,000 hectares; now the area covered is more than 14m hectares and rising. **Soya now occupies more land in Argentina than all other crops added together, covering more than half the country's arable land.** It is predicted that 10,000 hectares of forest is being lost every year - the equivalent of 20 football fields an hour. **If this continues, in five years' time the country's native forests will disappear completely.**

It is a scenario that is troubling conservationists. **'This is a precious habitat that is home to many rare animals and**

plants. We are in danger of losing it all in a race to feed European and Chinese chickens.,' says Emiliano Ezcurra of Greenpeace. 'How many jaguars and toucans will have to be killed to feed Danish pigs?'

But the campaigners are up against some of the world's most powerful corporations who now control the market in soya. In the mid-Nineties, with Argentina facing an economic crisis, Monsanto stepped in with an offer of salvation. Its message: plant our genetically modified Roundup Ready soya beans that are much easier to grow than conventional soya and the money will flow in. And so it happened. For the lucky few it has indeed been a godsend. A handful of soya barons are making handsome profits and the government of Argentina is enjoying improved tax revenues from exporting their soya to Europe and China.

But for many others, the drive to cover every spare hectare with soya comes at a high price. More than 200 miles north of Las Lajitas is the small rural Argentinian village of Pizarro. Carlo Odonez and his family run the main store. He was made redundant from the country's largest oil company a few years back and, with his payoff, brought his family to Pizarro with the dream of being an organic beekeeper. Yet all around the village, protected forest - where he hoped to keep his hives - is being destroyed to plant soya. The community of peasant farmers that has lived off this land for generations rearing cattle, pigs and chickens as well as producing cheese will soon be forced from their homes with nowhere to go.

'Nobody can see a future in staying here,' says Odonez, as he explains how the loss of trees will lead to flooding and changes in the local climate. Local people are also afraid of the mists of chemicals they have heard are sprayed on the soya.

'We hear many stories from other communities who have lived near the soya plantations,' said Odonez. 'Some say they have become

ill from breathing in the chemicals they spray. Also we hear some have skin diseases.'

Worst hit by the land clearances are the indigenous tribes that have lived for thousands of years in the forests. The Wichi people are an aboriginal group who still rely on a hunter-gatherer lifestyle. They use their dogs to hunt wild boar in the forests and collect four different types of honey from hollows in the trees. They make baskets and bags from local plants and use forest flora as a source of traditional medicine to cure their sick. **Now they face extinction as their tribal lands are ripped apart.**

A mile from one of their encampments the latest deforestation is occurring. Giant bulldozers linked together with huge metal chains drive through the forests literally tearing up everything in their path. The felled timber and leaves are piled high in 1km rows as far as the eye can see, ready to be set alight. It is hard for these people to understand the destruction of a habitat they have lived in harmony with for so long. 'Why is the white man destroying our lands?' asks one of the tribal chiefs. It is difficult to explain that it's to be used to feed animals in Europe and China.

If Argentina's soya revolution brought local economic benefits, perhaps there would be less hostility. But the genius of Monsanto's Roundup Ready soya is that it allows the crop to be farmed intensively with minimal labour. Only one worker is needed for every 400 hectares compared to more than 70 on a traditional citrus farm. By inserting a special gene into the plant's DNA, Monsanto's scientists discovered they could make it immune to a very powerful herbicide called glyphosate. Farmers can then spray this over their crops once or twice a year and everything but the soya is exterminated leaving the soya to grow vigorously with highly profitable yields and little maintenance. **So more than 300,000 farmworkers have lost their jobs. Most head towards the big cities like Buenos Aires or Salta to find work, but with few skills they end up unemployed and homeless.**

The story of the soya boom in South America, is not just limited to the GM revolution in Argentina. While other countries have not embraced Monsanto's beans with such gusto, such is the rush to cash in on the green gold that **similar scenarios are being played out in Brazil, Paraguay and Bolivia.** The marketing men have even dubbed the region the Republic of Soya.

For Brazil the environmental consequences of non-GM soya have been as dramatic as in Argentina. **Newly released satellite imaging data has revealed a 40 per cent jump in deforestation in Brazil's Amazon rainforests.** The massive leap is the worst acceleration in the loss of tropical jungle since 1995, with much of the destruction being blamed on the **illegal logging of land for soya production.**

Unlike Argentina, the majority of soya crops grown in Brazil are GM-free, although parts of southern Brazil are becoming contaminated with transgenic plants as farmers smuggle Monsanto seeds across the borders in the belief that they are more lucrative.

In September, the World Wide Fund for Nature published a detailed report on the impact of soya expansion in South America. It makes depressing reading. The WWF calculates that nearly **22 million hectares of forests and savannah in South America - an area about the size of Great Britain - will have been wiped out by 2020.** It says the crop has triggered soil erosion, siltation of waterways, widespread use of toxic chemicals and pesticides and road building through some of the world's most delicate habitats.

On the main road heading out of Las Lajitas, the slogan emblazoned on the giant advertising billboard reads 'mejor agriculture, mejor futuro' which translates as 'better farming, better future'. For many of the people in South America, it is a promise that rings hollow.

'Inside the soya bean you'll find the power to feed a family and feed the world. You'll find the ability to improve health and combat diseases. You'll find a unique combination of properties that makes the soya bean as important to animal nutrition and industry as it is to human health. In short, you'd find the magic in the magic bean.' (pure fantasy)

This is the world according to a brochure published by US multinational Archer Daniel Midlands, one of the handful of corporations along with Monsanto that today controls the multi-billion dollar soya industry. Others include Cargill, Bunge and Louis Dreyfuss.

Every weekday morning at 8.30am the bell rings at the Chicago Board of Trade to announce the beginning of the day's action. Dozens of brokers, wearing their famous bright-coloured jackets, wave their arms in a frenzy, trying to make big bucks for their investment clients on guessing what will be the future price of soya.

Today soya is traded as an international commodity, just like oil or gold. Depending on estimates of weather patterns, demand for animal food or general geopolitical pressures the price will rise or fall. By the end of the day millions will have been made or lost on these minute fluctuations.

With so many commercial interests dependent on the continued appetite for soya across the globe, those few telling a different story face an uphill struggle in getting their voice heard.

Perhaps the most graphic illustration of this was in the US three years ago. After a huge lobbying effort from the soya industry, the US Food and Drug Administration agreed to issue a health claim that eating 25g of soya protein a day can help lower cholesterol and thus reduce the risk of heart disease. This was a view later backed

by Britain's Food Standards Agency.

With heart disease one of the biggest killers in the West, this is clearly a major benefit for soya and has allowed many food companies to stamp labels on soya products claiming they help reduce cholesterol. In such a health and diet-obsessed culture this has been a big boost for the soya industry. However, it is very difficult for any individual to eat the necessary 25g a day of soya - this is equivalent to five soya yoghurts or three large glasses of soya milk.

Yet for two senior food scientists who worked within the US Food and Drug Administration, **the official backing of the health claim - which ignored the impact of plant-oestrogens in soya - was potentially dangerous.** In a highly unusual move Dr Daniel Sheehan and Dr Daniel Doerge wrote a letter of protest to the department of Health and Human Services at the FDA denouncing the claim, concerned that the problems of soya consumption were being ignored.

An extract from their letter seen by Observer Food Monthly states: **'We oppose this health claim because there is abundant evidence that some of the isoflavones [phytoestrogens] found in soy demonstrate toxicity in oestrogen-sensitive tissues and in the thyroid. This is true for a number of species, including humans. Additionally, the adverse effects in humans occur in several tissues and, apparently, by several distinct mechanisms...Thus, during pregnancy in humans, isoflavones per se could be a risk factor for abnormal brain and reproductive tract development.'**

It added: **'There exists a significant body of animal data that demonstrates goitrogenic [effect on the thyroid gland] and even carcinogenic effects of soy products.'**

Sheehan was particularly concerned about the increasing number of babies been weaned on soya infant formula. **'We are doing a**

large uncontrolled and unmonitored experiment on human infants,' he said.

OFM contacted the scientists but was told they are not allowed to comment publicly on the health risks of soya. Doerge suggested speaking to another expert Dr Bill Helferich, a professor of food at the University of Illinois who has discovered a possible link between the growth of certain breast cancer tumours that require oestrogen and the chemicals found in soya. Helferich was unwilling to comment on whether a woman at risk of such a cancer should stop eating soya products. But, when asked what the health implications were of increasing amounts of soya in the Western diet, he told OFM : 'It's like roulette. We just don't know.'

It is not just across the Atlantic that the increased consumption of soya has concerned authorities. In Britain, the Food Standards Agency commissioned a report from its Committee on Toxicity of Chemicals in Food to look at the issue. Published in May 2003, and titled Phytoestrogens and Health, the cover of this 400-page tome is illustrated with a soya plant.

In its introduction the report states: 'In 1940 adverse effects on fertility were observed in animals that had been grazing on phytoestrogen-rich plants. In the early 1980s it became clear that phytoestrogens could produce biological effects in humans.'

What follows is a highly complex and comprehensive analysis of every scientific study ever carried out on the subject of plant oestrogens. The scope is immense: interaction with immune systems, central nervous systems, thyroid glands and cardiovascular systems. It analyses evidence for and against the impact of these soya chemicals on breast cancer, prostate cancer, stomach cancer, colorectal cancer and lung cancer.

The findings are inconclusive. Some case studies find soya reduces

the risk of one cancer, but possibly increases the risk of another.

Professor Frank Woods was the chairman of the working group that produced this report. He is one of the country's leading toxicologists and has been a key government adviser. If anybody can be called an expert on soya, it is him. Yet even he will not be drawn on whether the increase in soya in Western diets is good or bad. 'We still have a lot to learn,' he said. There is, however, one area where his mind is made up. 'If my daughter ever asked me advice on whether she should feed her baby on soya formula, I would say no, unless her doctor had specifically advised her to do so.' Even if the baby had an allergy to dairy products, he believes that other options, such as hydrolysed cow's milk protein, are safer.

'Soya has been eaten for thousands of years as a mainstay of Asian diets,' said Dominic Dyer of Britain's Soya Protein Association. 'There is no evidence of reduced fertility in these populations or an increased risk in any other of these problems allegedly related to soya. Indeed the opposite is true. They are healthier, live longer and have less chance of dying from diseases like breast cancer.'

This is a powerful argument in soya's favour but scientists such as Professor Woods, who studied this issue as part of the FSA's report, says it is far more complex than just attributing these facts to the intake of soya in their diets.

US nutritionist Kaayla T Daniel who has studied the history of soya consumption dismisses the comparison, arguing that the soya eaten in China and Japan, such as tofu and miso, is very different from the industrially processed variety used in today's Western food. **'Claims that soya beans have been a major part of the Asian diet for more than 3,000 years, or from "time immemorial" are simply not true,'** she said.

The soya bean originated in China, and according to Daniel the ancient Chinese called it 'the yellow jewel' but used it as 'green manure' to enrich the soil for growing other crops. She says soya

did not become a staple human food until late in the Chou Dynasty in 1134 BC when the Chinese developed a fermentation process to turn the bean into a paste best known by its Japanese name miso. The liquid poured off during this production of miso is what is known as soya sauce. She claims **that the traditional process of making fermented soya products like tofu or tempeh destroys many of the allegedly dangerous chemicals in soya, unlike modern factory methods used today.**

For Daniel, environmentalists and a growing number of scientists, the point is not that soya is all bad but that neither is it the cure-all for many Western ills. And there is certainly no escaping its environmental impact.

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