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OPINION

Monsanto

The parable of the sower

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The debate over whether Monsanto is a corporate sinner or saint

Monsanto



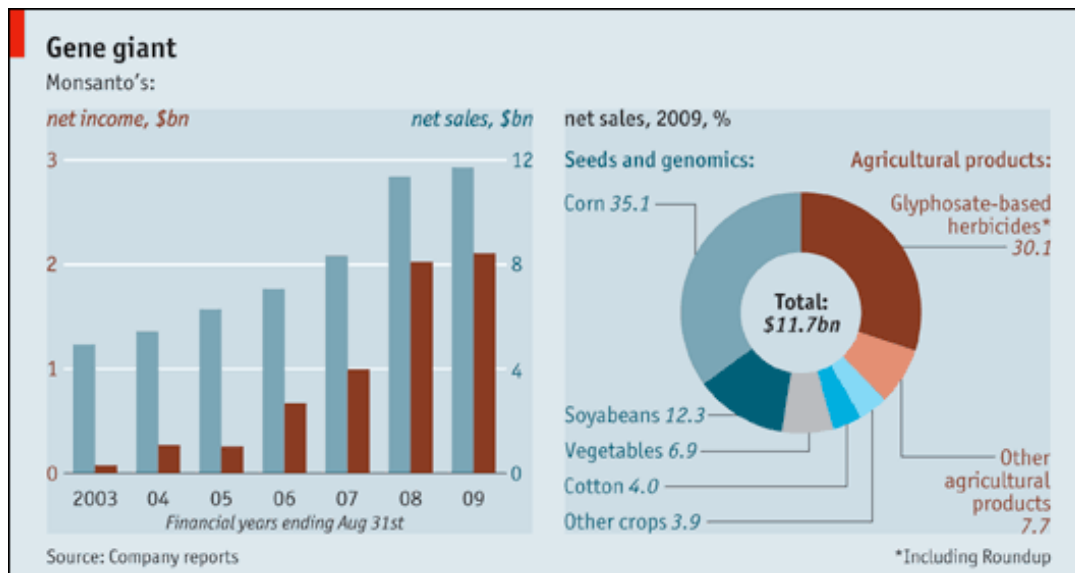
FEW companies excite such extreme emotions as Monsanto. To its critics, the agricultural giant is a corporate hybrid of Victor Frankenstein and Ebenezer Scrooge, using science to create foods that threaten the health of both people and the planet, and intellectual-property laws to squeeze every last penny out of the world's poor. The list of Monsanto's sins dates back to when (with other firms) it produced Agent Orange, a herbicide notorious for its use by American forces in Vietnam. Recently "Food Inc", a documentary film, lambasted the company.

To its admirers, the innovations in seeds pioneered by Monsanto are the world's best hope of tackling a looming global food crisis. Hugh Grant, the firm's boss since 2003, says that without the sort of technological breakthroughs Monsanto has achieved the world has no chance of doubling agricultural output by 2050 while using less land and water, as many believe it must. Mr Grant, of course, would say that. But he is not alone. Bill Gates sees Monsanto's innovations as essential to the agricultural revolution in Africa to which his charitable foundation is committed. Josette Sheeran, the head of the United Nations World Food Programme, is also a fan.

Monsanto has come a long way from its roots in pharmaceuticals and chemicals (in which capacity it made Agent Orange). The original company was formed in 1901 to make saccharine. In 2000 it merged

with Pharmacia & Upjohn, a drugmaker. Two years later the group's agricultural activities were spun off into a new Monsanto. At that time the company was best known for Roundup, a herbicide popular with farmers. Roundup is still a leading brand, but margins have been eroded by competition from Chinese producers of other forms of glyphosate weedkiller. Roundup's share of Monsanto's revenue is shrinking towards 10%. There is talk that it might be sold. "It is no sacred cow. We look at it every year," says Mr Grant.

Today most of Monsanto's \$11.7 billion of annual sales come from seeds, increasingly of genetically modified (GM), or transgenic, varieties (see chart), and from licensing genetic traits. Indeed, it is now best known, for better or worse, for applying biotechnology to seed production, winning a string of the sort of patents on living organisms that became legal in America only after a Supreme Court decision in 1980. In July it gave its GM seed a new master brand: Genuity, a name that evokes "being genuine, authentic and original", according to a company spokesman. It will denote a "family of innovative products that will enable farmers to do what they do best, even better."



In the 13 years since GM seed was first farmed commercially, agriculture—and Monsanto with it—has become increasingly central to several of the world's most pressing policy debates, says Mr Grant, a Scot who joined the company in 1981. Nowadays he spends a good deal of his time taking part in those debates, which range from concerns about higher prices and shortages of supply to the use of land for growing biofuels rather than food, climate change and water. Arguments over water, thinks Mr Grant, "will dwarf the discussion that has taken place so far over food." Monsanto is also getting caught up in the debate over intellectual-property rights in food and their implications for antitrust policy, on which Barack Obama's administration sounds less friendly than that of George Bush. It has already marked agriculture for attention.

How successful Monsanto and rival makers of GM seed, such as DuPont and Syngenta, are in winning round a sceptical public and policymakers will play a big part in determining how lucrative their innovations prove to be. In public attitudes to GM food, Mr Grant believes "there's been progress everywhere compared with 15 years ago." Still, Europe remains "slow, a real slouch. European farmers have been denied the right to choose." Although the European Union is slowly becoming open to imports of GM food, it is still largely opposed to growing the stuff. Monsanto has still to complete a test of any GM seed in Britain because protesters have destroyed its experiments. In Latin America, by contrast, Argentina and Brazil are both growing GM corn (maize) and soyabeans. In some ways, rising awareness of the food crisis has helped people to see "GM as something with potential benefits other than just

boosting the profits of Big Food,” says Mr Grant—to Monsanto’s benefit. Well, maybe.

Turbo-charging Mendel

Monsanto’s innovations fall into two categories. The first is breeding, which seedmakers have been doing with increasing sophistication for decades. Monsanto is able to accelerate the process of selective breeding through better mapping of a seed’s genetic qualities and its suitability to grow in a particular place.

At Monsanto’s research laboratory in St Louis, the company’s home city, farmers on one of the many tours that are part of its marketing efforts are clearly fascinated by a piece of technology known as the corn chipper. A machine picks up an individual seed, rotates it to the right position, then chips off a sample, which has its genetic material analysed. (Getting the seed in the right position is the hardest step, because each one has a different shape and it is crucial that the chipper does not damage the embryo and thus stop the seed from growing properly.) The likely attributes of the plant that would grow from each seed are predicted from its DNA, the most promising seeds are planted, and the process is repeated with the seeds that those plants go on to produce.

The tour guide refers to the operation as “CSI: St Louis”, although testing now goes on all year, at centres around the world. In the past three years this technology has helped speed up dramatically Monsanto’s ability to identify and grow the most productive seed for any given location. “It is the mother and father of all dating agencies: we can analyse every single seed we harvest, do a health check, guess what its grandchildren will be like, send it anywhere in the world,” says Mr Grant.

The second category of innovation, in which Monsanto is becoming increasingly adventurous, is genetic modification: identifying genetic traits with particular qualities and transplanting those traits into seeds to improve their performance. In essence, the goal is to pack as much technology into a seed as possible.

The biggest breakthroughs so far have been in weed and bug control. Perhaps the most common feature of Monsanto’s range of seeds is that they are Roundup Ready, meaning that they are guaranteed to survive spraying with Roundup that will take out any surrounding weeds. Some plants have been bioengineered to deter pests from eating their leaves and roots, which reduces or even eliminates the need for insecticides. Farmers on their tours cannot fail to miss the display cases in which a healthy Monsanto plant grows next to a seriously ailing traditional specimen of the same variety.

Monsanto has just launched two new varieties of seed that have been engineered to be far more productive: Genuity SmartStax corn, which company trials suggest can increase yields by 5-10%; and Genuity Roundup Ready 2 Yield soyabeans, which in trials have shown yields 7-11% higher than the first generation of Roundup Ready soyabeans. Over the past couple of decades, soyabean yields have risen at an annual rate of barely 1%.

In around 2012 or 2013 Monsanto expects to launch a soyabean whose processing will result in fewer transfats. It will also offer an “omega-3 soyabean”, genetically enhanced to give consumers the many proven health benefits of omega-3 fatty acids. Until now, omega-3 has been harvested from fish and so, in Mr Grant’s words, “products with omega-3 in them taste a bit fishy.” Fish derive omega-3 from algae, so Monsanto has done likewise, extracting the relevant genetic material from the algae and putting it into soyabeans. Now, he says, without the fishy taste, omega-3 will go well in yogurts, health bars and so forth.

The company is also aiming to engineer seed to use nitrogen more efficiently—and hence to require less fertiliser. This would reduce farmers’ exposure to the price of oil, from which fertilisers are made, and the damage done when nitrogen leaches into the water supply.

In about three years’ time Monsanto expects to launch its first “drought tolerant” products. It is

examining several ways of making plants more tolerant of drought. One is to improve the roots' take-up of water. Another is to reduce water loss through the leaves. A third is to alter plants' reaction to lack of water. When stressed, a plant shuts down growth in order to conserve what it has. They often over-react, and use a lot of energy when they restart. Genetic modification can help it interpret water conditions more accurately and avoid unnecessary stops and starts.

Because water shortages are predicted for many parts of the world, Monsanto expects these drought-tolerant plants to be a huge commercial success. The first of them will be corn, intended for a dry strip of America running from northern Texas to the Dakotas. Drought-tolerant technology has also prompted Monsanto to start focusing on dry-land wheat. Wheat acres have declined in recent years, contributing to shortages. In July the company paid \$45m for WestBred, a wheat-seed firm.

Trust and antitrust

Acquisitions have been a key part of Monsanto's strategy, giving it access to new seed markets. In 2005, it began to apply biotech to vegetables after buying Seminis, the world's largest vegetable-seed company, for \$1.4 billion. Since it was spun off, Monsanto has made more than 20 acquisitions (as well as several disposals). Those purchases are one reason why it was singled out as an appropriate target for the antitrust authorities in a paper published in October by the American Antitrust Institute, an independent competition watchdog. The paper laments the "impaired state of competition in transgenic seed"—which it blames on Monsanto above all.

The company's acquisitions have been crucial in creating the horizontal and vertical integration that support its platforms in cotton, corn and soybeans. Last year its share of the markets for GM corn and soybeans was about 65% and that for GM cotton about 45%. The institute's paper argues that, thanks to its dominance, Monsanto is actually harming innovation in seed. Monsanto had to make concessions to win the antitrust authorities' approval for two of its biggest purchases, of DeKalb in 1998 and of Delta and Pine Land in 2007.

eyevine



The next generation in the greenhouse

True, for the past 13 years Monsanto has been licensing its technology broadly, to hundreds of firms, including some of its main competitors. This, the paper concedes, has ensured that Monsanto has not ended up in "control of large, totally closed platforms in transgenic seed that could be challenged only by the unlikely emergence of rival platforms." However, it cites Monsanto's reputation for defending its intellectual property fiercely through the courts as another reason why the antitrust authorities should take a look at the firm.

Monsanto's terms of business require farmers to buy fresh seed every year. Its new Violator Exclusion

Policy denies farmers who break the terms of its licences access to all its technology for ever. This summer it achieved its latest success in enforcing its stern line when it won a case against some Canadian farmers who had held on to seed.

Agricultural markets have been mentioned as an area under review by officials in the antitrust division of the Department of Justice. The DoJ is expected to make Google its main target, but it will be no surprise if Monsanto comes a close second. Already, the DoJ is looking into complaints by DuPont, perhaps Monsanto's fiercest rival. In May Monsanto sued DuPont, alleging that Pioneer, DuPont's seed arm, had broken licensing terms for herbicide-resistant technology in corn and soybeans. After an ugly war of words, DuPont countersued and complained to the DoJ.

"We are in a hyper-competitive business. Farmers have no shortage of choice," insists the unapologetic Mr Grant. "Our goal is to be competitive every spring at the farmer's table. A farmer may be willing to abdicate the decision on what chemicals to use, but not on what seed to plant. We aim to win one field at a time, one spring at a time." Enforcing licences is crucial to that strategy. Just as in the drug industry, innovation is expensive: Monsanto has a research and development budget of nearly \$1 billion a year, and reckons it costs \$100m to bring a new GM seed to market. If there is to be innovation, the firm insists, intellectual property must be protected.

However, Monsanto is using different language—and a different approach from that of big drugmakers—when it comes to dealing with the millions of poor people in Africa. Mr Grant says that he is determined not to repeat the mistakes of the pharmaceutical industry in holding back on making valuable innovations available to the developing world. He believes that "in a perfect world, on the same day you launch [a drought-resistant seed] in Kansas, you would launch it similarly in Nairobi"—although in practice Africa and other poor places that are short of water will have to wait a while longer.

Over the past three years, the firm has started to play a leading role in efforts collectively described as an attempt to create a "green revolution in Africa". Mr Grant talks enthusiastically about his friendship with Norman Borlaug, the driving force behind the Green Revolution, first in Mexico, then in Asia, in the second half of the past century, which is generally reckoned to have saved at least 1 billion lives. Shortly before his death this year, aged 95, Borlaug reportedly expressed regret that he would not live to see the "gene revolution".

In white corn, a staple in Africa and Mexico, Monsanto has donated all its intellectual property, seed and know-how for developing drought-tolerant genes to Water Efficient Maize for Africa (WEMA), a public-private partnership that has received grants from the Bill & Melinda Gates Foundation and the foundation of Howard Buffett, an Illinois farmer (and son of Warren Buffett). The five countries to benefit are Kenya, Mozambique, South Africa, Tanzania and Uganda. Mr Grant expects to launch drought-tolerant corn in Africa within two or three years of the launch in America. The company is also working with Millennium Villages, an anti-poverty project led by Jeffrey Sachs, an economist at Columbia University.

Big Pharma versus Big Farma

In contrast to the anti-retroviral drugs that pharmaceutical companies sell in Africa, this product will generate no royalties for Monsanto, says Mr Grant. "The buzzword is the 'democratisation of technology' and we have learnt from Big Pharma the dangers of being too slow," says Mr Grant. The fact that seeds suited to one place do not necessarily grow well elsewhere greatly reduces the risk of parallel imports that affected the drugmakers. They feared that drugs given away in Africa would be shipped back to rich countries, undermining their business there.

That said, he does not believe that Monsanto could or should be expected to solve this problem on its own. "We studied what Borlaug did, which was work with local NGOs, tapped research institutes, brought disparate groups together. The new piece today is getting big companies involved, which hopefully means we can get this done much faster than Borlaug did."

Mr Grant nonetheless regards this approach as “good business”, not least because the developing world will be a huge source of future growth for the firm. Monsanto sells more GM cotton in India than in America. Already, most of the countries where GM seed is sown are emerging ones. Around 90% of the world’s 12m farmers with at least a hectare planted with GM seed are smallholders in developing countries. America has 250,000-300,000 active farmers; India has 15m cotton farmers alone, several million of whom Monsanto says it has reached already.

This reinforces the firm’s fundamental message, that it is a driving force for higher farm productivity—and that higher productivity, not a return to the methods of the past, is likely to be the true source of agricultural sustainability. In America, GM seed has already brought about huge increases in productivity, says Mr Grant. He has no time for the “Malthusian thing about running out of food. This is eminently solvable.” He sees huge potential in merely raising yields in the rest of the world to levels already achieved in America thanks to better farming practices, Roundup and improved seed productivity. American farmers average about 160 bushels (of 56lb, or 25.5kg) of corn per acre per year, against 60 in Brazil and 27 in sub-Saharan Africa (22 excluding South Africa).

Moreover, even in America there is the potential to double yields again. Already, farmers in Iowa are producing as many as 200 bushels an acre. Mr Grant believes that 300 bushels are achievable by 2030. “We have just scratched the surface,” he says, pointing out that after the first GM crops came on the market in 1996, it took ten years for 1 billion acres to be planted. But the second billion took only another three years. “We are where transistors were in the 1970s.”

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