

A losing battle?

The European fine chemicals industry is upbeat about agro, but the experts are sounding warning bells. Andrew Warmington reports from **Chemspec Europe 2014**

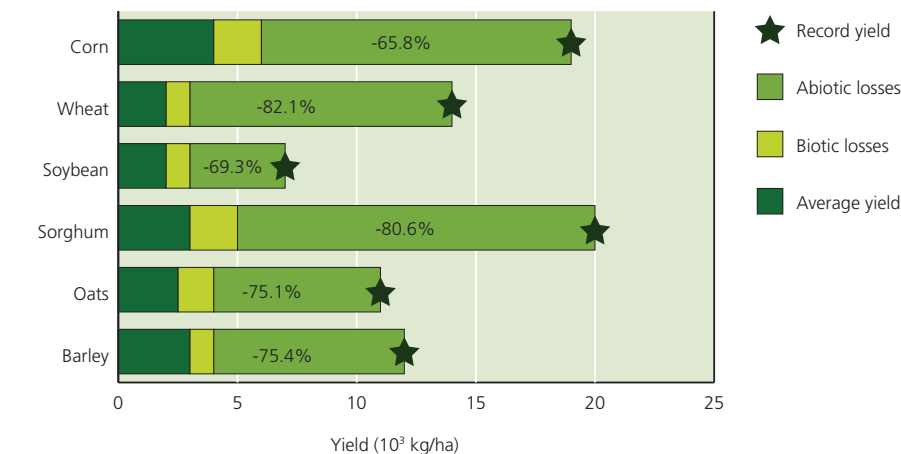
As the world's largest trade exhibition in the agrochemicals space, Chemspec Europe always has a strong agrochemical element in its related content. That was never more the case than this year in Budapest, when almost all of the leading consultants in the field were among the speakers at the European Fine Chemicals Group (EFCG) Crop Protection & Fine Chemicals forum and *Agrow* magazine's Agrochemicals Conference.

Chemspec Europe itself has rebounded since 2008, helped in no small measure by the recovery of the agrochemicals sector itself in that time frame. Suppliers to the sector were unanimously upbeat about the state of the market when interviewed on the show floor and optimistic going forward. Yet this was in many ways widely at odds with the gloomy prognosis from some consultants.

"The current business model is failing to sustain the European fine chemicals industry and it's failing to make the contribution to the global environment that it should be making," said Dr Rob Bryant of **Brychem**. His presentation was ultimately about showing how the industry can regain lost ground and persuade customers to let it resume doing "what it has done superbly in the recent past" – basically to make all their chemicals for them.

Many of the fundamental facts affecting the industry appeared in multiple presentations and are beyond dispute. As the world population grows and demands more – perhaps 70% more by 2050 – and more intensively grown food from a decreasing area of farmland, a massive increase in productivity will be needed. Food prices will continue to increase for the foreseeable future.

Meanwhile, the prospect that GM technology would remove or even reduce the need for crop protection has vanished, ironically giving a temporary boost to the market in Europe, the



Source - Sumitomo Chemical

Figure 2 – Losses to US crop yield by crop

world's most conspicuously non-GM region. Keeping up with the constantly evolving challenge of pests is a vital part of the effort to feed the world and will drive a continuing increase in the volume and value of agrochemicals used.

According to Dr Matthew Phillips of **Phillips McDougall**, the global agrochemicals market – including non-crop applications – at ex-manufacturer level stood at \$60.7 billion in 2013, an 8.5% increase on 2012. Seeds, just over half of which are now GM, were worth \$39.4 billion, an increase of 5.0%. This came after years of pretty much continuous growth from a low of around \$37 billion in 2006. Real growth of 2.6%/year is forecast to 2018.

Others cited basically similar figures, allowing for the fact that definitions vary from one analyst to another. Europe accounts for about 26% of the global agrochemicals market, though it was overtaken in size by Asia in 2012. Figures cited by Sanjiv Rana of **Agrow** itself from an ECPA report that was also compiled by

Phillips McDougall put the European market at \$13.3 billion in 2012, with 9.9% growth since 2007 (Figure 1). The EU 28 had enjoyed 8.9% growth, while those outside the EU – most obviously Russia and Ukraine – had seen 14.5% growth.

In both volume and value terms, Ukraine was the fastest growing agrochemicals market (though one imagines, sadly, that this will not be the case in 2014). Some crops, notably cereals, maize and sugar beet, saw double-digit growth in agrochemical demand; only potatoes did not show growth and one might infer that regulatory causes lay behind that.

Citing figures from Sumitomo Chemical Europe, Bryant showed that for every major cereal crop, biotic losses – those caused by the pests controlled by crop protection products – are a minor issue for farmers (Figure 2). Abiotic losses from drought, salinity, flood, chilling or climate stress account for 65–81% of the gap between average and maximum attainable yields for corn, wheat, soybeans, sorghum, oats and barley.

"It puts our industry's role in perspective," Bryant said. Crop protection chemicals, he added later, only account for 10% of all farming input costs, while the \$20–30 billion fine chemicals industry, excluding captive production, is less than 1% of the total chemicals industry, which, from CEFIC figures, were just over \$3.1 trillion in 2013.

Meanwhile, shocking though it may sound, the proportion of the US crop lost to weeds, diseases and insects actually increased from 30% in 1942–50 to nearer 35%. This was partly the result of farm subsidies, the loss of active ingredients (AIs) deemed to be unsafe or too specialised to support registrations and the big

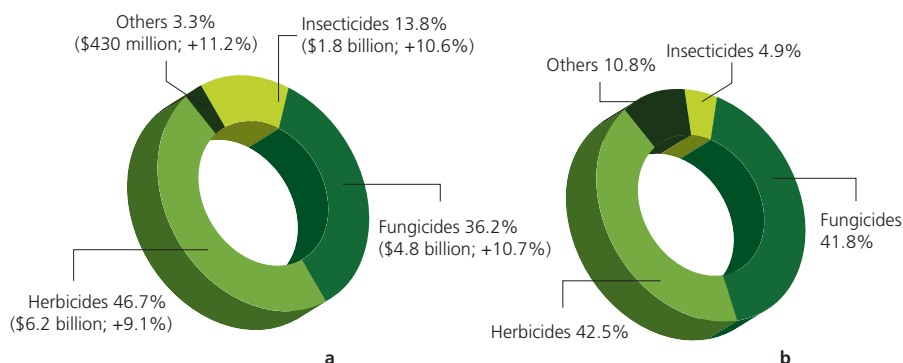


Figure 1 – European agrochemicals market by type 2013: Value (a) & volume (b)

R&D-based companies' increasing focus on GM technology.

The largest consumers of agrochemicals, according to Cropnosis figures cited by Bryant, are fruit and vegetables. They account for 32.5% of the total, as well as 50% of the fungicides and 44.8% of the insecticides. This is also the most "squeezed and regulated" sector. Some astonishing anomalies have arisen: there are now no approved nematicides for potatoes in the UK, despite it losing 15-20% of its huge potato crop to nematodes, and there may one day be no approved insecticides for them there either. Bananas worldwide are "in a desperate situation".

Allied to this has been the well-documented concentration of the agrochemicals industry, from 42 companies in 1960 to 33 in 1980 to just the six who hold 70-80% of the market now. "This is shocking, it won't stimulate competition and they really do lord it over the fine chemicals industry," Bryant said. The top six producers also account for over 60% of the GM seeds and traits market.

In Bryant's view, however, the single biggest issue is regulation and the regulatory expert who spoke at the EFCG Forum, Peter Chapman of **JSC International**, agreed entirely. Reviewing Directive 91/414, subsequent regulations that have affected the industry and now Regulation 1107/2009, Chapman concluded that the effects of the Regulation on the industry have been almost wholly negative.

"The Regulation has created a hazard-based system out of synch with most of the rest of the world and imposed massive additional costs on industry but has still given it uncertain outcomes," he said. "Timelines have not been met, procedures are still not fully harmonised and there has been a further loss of existing active substances (ASs), with fewer new ones coming to market."

Indeed, one highly important provision of the Regulation is to come into effect shortly. Annex II, Chapter 4 outlines seven conditions on which ASs could be defined as candidates for substitution and an initial list is expected this month. Chapman estimated that about 100 ASs could be impacted, over 25% of the total, leading to a further loss in the choice available to European farmers.

"Is there still an incentive for the major R&D companies to develop ASs for registration in the EU? No, and it is probably still diminishing. Is it easier to gain first registration elsewhere and only register in the EU once the actives are established elsewhere? Yes. And is the EU regulatory regime denying farmers and growers safe and effective plant protection products. Yes, again," Chapman concluded.

It is a telling fact, Bryant continued, that the QA and QC departments typically dwarf the R&D department at fine chemicals companies. The tail wags the dog and this has helped to stifle innovation.

"Producers are locked into processes that were developed quickly to ensure that the original product launch was not delayed – and

by God, there are some terrible processes," he said. "There are precious few incentives to improve the chemistry, so it is often relatively inefficient. This locking-in continues even when production goes East." Ironically, the result of this is more environmental problems.

As others illustrated, the number of new products in development has fallen from typically 80-100 before 2000 to more like 40-60 now, while the number of new AI launches has fallen even further. Growing development costs have played a big part in this, as Phillips showed in more detail (Figure 3). "It's the 'D' in R&D that's killing the industry," Bryant said.

Moreover, as Rana pointed out, Europe's share of global R&D has fallen from 33% in the 1980s to 7.7% in 2005-14, while, according to figures from Phillips McDougall that Chapman cited,

Europe's share of new AI registrations fell from 31% in 1990-9 to 16% in 2005-14. The politicised regulatory regime, with strong lobbies against both GM technology and pesticides, delays in GM crop approvals and the ability of EU member states to ban GM crops, plus the recent ban on three neonicotinoids implicated in the decline of bees have all made Europe a relatively unattractive location for crop research.

One factor that Bryant did not dwell on in this context, though others did, is the huge importance of proprietary off-patent compounds in this field. As Dr Nigel Uttley of **Enigma Marketing Research** noted, only 25% of all AIs by market value have patent protection, 25% more are true generics – the vast majority of this being glyphosate – and 50% are proprietary off-patent.



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Arfvedson Schlenk Award 2015

The Gesellschaft Deutscher Chemiker (GDCh) takes pleasure in announcing that the Arfvedson Schlenk Award donated by Rockwood Lithium GmbH will be awarded again in 2015.

Johann August Arfvedson was the chemist who discovered the element lithium while Wilhelm Schlenk is known as a pioneer in organolithium chemistry.

The Arfvedson Schlenk Award intends to honor outstanding scientific and technical achievements in the field of lithium chemistry.

Nominations for the award are to be addressed by **December 1, 2014**, to Barbara Köhler, Gesellschaft Deutscher Chemiker, Postbox 90 04 40, 60444 Frankfurt/Main, Germany. These should include a letter of nomination, the curriculum vitae of the nominee together with his/her list of publications.

Self-nominations are not allowed.

The award ceremony will take place at the GDCh Chemistry Forum in September 2015 in Dresden. The recipient will receive a medal, a certificate and a monetary prize of 7,500 Euro.

Prof. Dr. Carsten Strohmann,
Chairman of the Award Selection Committee

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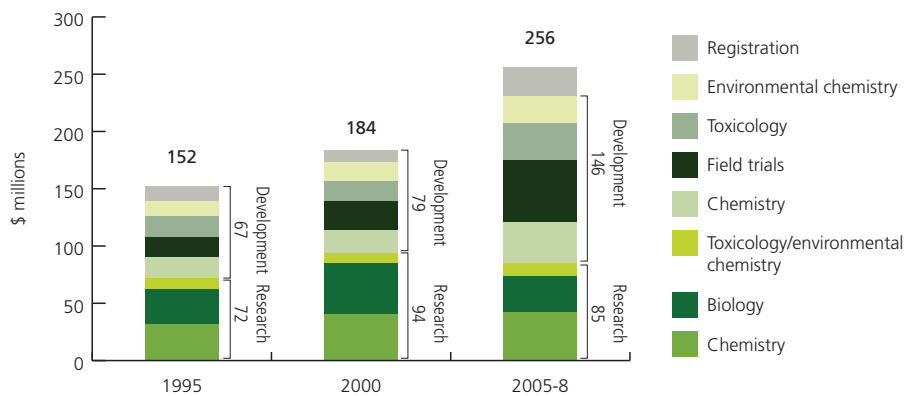


Figure 3 – Cost of bringing a new AI to market (\$ million), 1995-2005-8

The R&D-based companies, Uttley and Phillips noted, are spending an ever-increasing proportion of their budget on post-launch development, which mainly equates to clever strategies to prolong the lives of their products beyond patent expiry. This is just one of the possible defence strategies against the decline in new AIs that Uttley discussed at length, but, one might argue, the process is tending to reinforce the decline in innovation.

Meanwhile, Bryant continued, the burden of discovery has moved East. Japan and China now account for a disproportionate number of new leads, 19 and 12 respectively in 2009-10, as against 13 in the US and ten in Europe. One consequence of this is that insecticides, which are more important in East Asian climates, have become the dominant R&D focus, reaching 28 of the 45 new leads in 2009-10.

Meanwhile, the US-based majors have very few compounds in development because of their emphasis on GM research. (As Phillips showed, total R&D on seeds and traits matched that on traditional agrochemicals in 2009 and the gap is growing still, albeit that total research on both is still climbing.) “However, over-dependence on a limited range of tolerant herbicides has its dangers, as illustrated by the emergence of glyphosate resistance, particularly in the US,” Bryant said.

Looking at the manufacture of AIs, he observed, most are still made by major agrochemicals groups in their own facilities, with only those for older, less important products outsourced. Raw materials and intermediates are usually sourced from specialists, the former overwhelmingly from China – even India mainly depends on China in that respect.

“Chemical process innovation is generally limited to captive groups, which produce ‘patent swamps’ to protect technology. The trend over the past ten to 15 years has been to favour toll manufacture over custom synthesis in order to retain tighter control of the technology. This has led to the dumbing down of the fine chemicals industry,” noted Bryant.

Conversely, major agrochemicals companies have still exposed their key technologies to Asian competition by starting to transfer even

their newest AIs straight to Asia. Bryant cited one new DuPont insecticide.

The company is making 2,000 tonnes of this in 2014-15, a proportion of which is by two Chinese sub-contractors. Independent Chinese firms are expected to make a further 750 and there is also the threat of ‘clone’ factories springing up to compete, as has happened many times before. “We’ve just sat back and let it happen,” he said.

Chemical process innovation remains in Japan, where early intermediates and pilot quantities of AI are sourced. Production scale-up mainly takes place in China; indeed, the CCPA recently claimed that the sales of China’s top 100 agrochemicals companies nearly doubled from \$8 billion in the 2007-8 financial year to \$15.9 billion in 2013-4, with about 80% being exported to the US, Europe and Japan.

Uttley separately showed that, through a mixture of government sponsorship and the free market, the number of Chinese agrochemicals makers has boomed to over 2,600 in the past ten years. This has, however, led to oversupply, poor profitability and environmental problems. The Five-Year Plan that runs to the end of 2015 envisages big changes to address this.

The numbers of pesticide and AS companies are both to be reduced by about 30%, with the top 20 accounting for 50% of sales by 2015 and 70% by 2020. The government envisages creating 20 companies with revenues of >\$300 million/year and two or three leaders with >\$1.5 billion/year – hence, in part ChemChina’s acquisition of Makhteshim Agan.

This, it is hoped, will alleviate some of the environmental problems that have arisen and lead to development being market-led rather than technology-driven, while also giving the world greater transparency and security of supply from China. The big question, in Uttley’s view, is whether China will be able to continue to supply the growing demand for off-patent AIs.

All in all, Bryant said, the European fine chemicals industry has been the loser through all the trends. But is there a better way to make agrochemicals? Yes, he thought, and precisely because of the problems caused by the fine

chemicals industry becoming a cost centre to be managed as investor power drove the chemicals and biosciences industries to consolidate around key products.

“The current problems are clear: too much capacity for any given technology, low average process efficiencies, not enough good engineering solutions being adopted, insufficient ingenuity and too much copying, regulatory ‘locking in’ and not enough time being devoted to generating the best process economics.”

The European fine chemicals industry is well positioned to recover some of what has been lost, Bryant continued. Convincing customers will not be easy and change will take a long time to come but now is as good a time as any to start. An independent fine chemicals industry could bring a lot to agrochemical manufacturing:

- An industry dominated by organic chemists will continuously develop new and improved processes, because that is what they care about
- The fruits of cutting costs could be shared equitably between the industry and its customers
- Investors could continue to reap returns at the finished product stage, reconciling their short-term interests with the long-term needs of a capital- and technology-intensive industry
- European producers can be relied on to respect IP, because there is real legal redress in Europe against any who do not

“As the relative cost advantages enjoyed by Asian suppliers decrease, European fine chemicals companies can emphasise the advantages of an independent fine chemicals industry to their customers,” Bryant said. These advantages are: reliable, local production that conforms to increasingly stringent regulatory demands; more efficient and better engineered processes; a reduced environmental load; and, consolidation to avoid unnecessary capital investments.

“The fine chemicals industry is uniquely positioned to take on the challenge. China and India use established technology and have no incentive to change – yet. This is our opportunity. We still have an education system that makes people think. The trouble has been that innovation doesn’t pay, nor does being a chemist. That has made fine chemicals a mug’s game.”

However, the European fine chemicals industry retains the scale and power to be its own master again. It should persuade its customers to let them manufacture the AIs wherever possible, and should also both consolidate and reduce its scale to recover its necessary dynamism.

The ingenuity of the chemists and engineers should once again become the determinant of success. And after all that, “our customers might again develop a respect for what our profession can offer and pay the industry accordingly”.