

# Are we over-dependent on China?

**Dr Rob Bryant of Agranova-Brychem** asks whether the global agrochemical industry has developed an over-reliance on limited regional sources for its raw materials, intermediates and actives

Much has been said about supply shortages of manufactured goods during the continuing COVID-19 pandemic. Further rumours of rationing and preferential treatment at government level have generated a common perception that it might be better if countries returned to a policy of self-sufficiency.

Many crop protection industry participants have argued over the years that a growing dependence on a limited number of regions for fine chemical intermediates and, in some cases, active ingredients (AIs) was risky. However, these risks have generally been ignored, in order to obtain lowest prices for these chemical inputs and maintain 'lean' supply chains.

## Industry overview

Between the late 1940s and the early 1990s, the international agrochemical industry evolved through a number of stages, as it grew and matured. The initial consolidation and subsequent reduction in major companies involved in R&D has been tracked many times by a number of authors.<sup>1</sup>

Figure 1 shows the dramatic decrease in the numbers of US and European agrochemical companies. The top six command nearly 75% of global sales. Japan's industry followed a different pattern of development and has

therefore been excluded from this current description.

In the early days, characterised by the now infamous phrase 'spray and pray', most AIs were developed in the labs of chemical companies and distributed to a myriad of small companies capable of delivering the products to farmers.

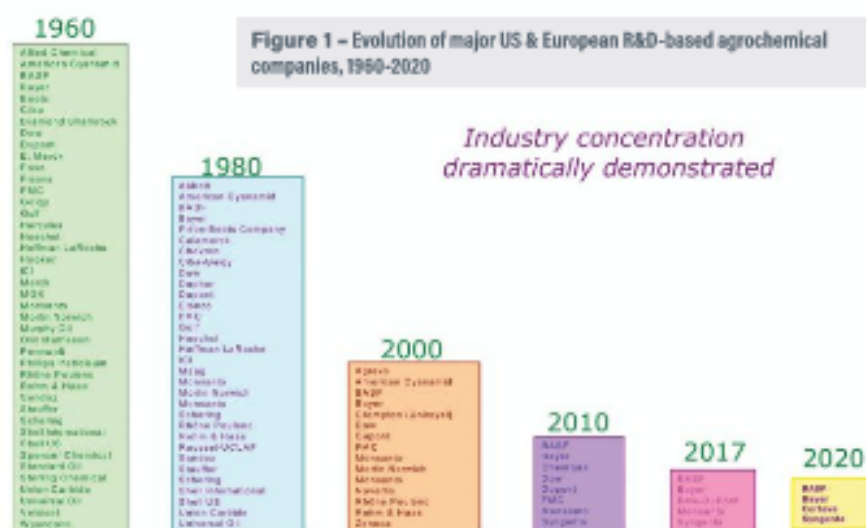
Over the years, the degree of sophistication within the R&D labs gradually increased. As the scientific basis of agrochemical research improved, so did the researchers' methods. Resources converged with those being applied in pharmaceutical research.

The era of the bioscience companies followed, with major groups becoming involved in research on human and plant diseases. This was a fruitful

period, which began to fizzle out as the era of biopharmaceuticals dawned in the mid-1990s.

Within a few years, the multinational bioscience majors had demerged their agrochemical businesses in order, as the mantra went, to maximise profits. At the same time, several agrochemical majors were investing heavily in seed companies in order to position themselves for the coming biotechnology revolution in agriculture.

The impact of these changes has been far-reaching. The relatively few surviving companies have spread their activities across the world to extract the maximum benefits from their discoveries. However, many became less able to innovate and





Oilseed rape and sugar beet lack insecticidal protection under current EU regulation



concentrated on offering strong customer services to gain the benefits of their sales and marketing.

### Fine chemical supply chains since 1980

As the industrial background of companies inventing novel agrochemicals changed from strongly chemical-based to more research-based, independent specialists in what became the fine chemical industry developed processes under contract to make the increasingly complex molecular targets being discovered. Similar symbiotic

relationships with pharmaceutical companies allowed specialists to develop technologies with applications in both sectors.

This beneficial situation continued but is rapidly changing its character and geography, as a result of the emergence of the two giant Asian economies, India and China. Both offered huge, relatively undeveloped markets for agrochemicals and pharmaceuticals, so it clearly made sense for the Western agrochemical industry to engage with the governments of these countries to secure new and profitable business.

The trade-off often involved the contracting companies in India and China requiring reciprocal manufacturing opportunities in exchange for market access. China's insistence on joint ventures, in which Western technology was transferred to the Chinese partner, became an additional source of business loss for the US and European subcontracting specialists, as process know-how left the control of the inventing companies.

India emerged about ten years ahead of China and focused on developing its own fine chemicals industry to supply the local market with the newer drugs, which had previously been too expensive for most of the population. In the process, India became reliant on China for the basic starting materials used to produce the APIs its industry needed. This suited China, where the skills base leaned more towards engineering and chemical technology than industrial process chemistry.

As the Chinese chemical industry acquired processes for



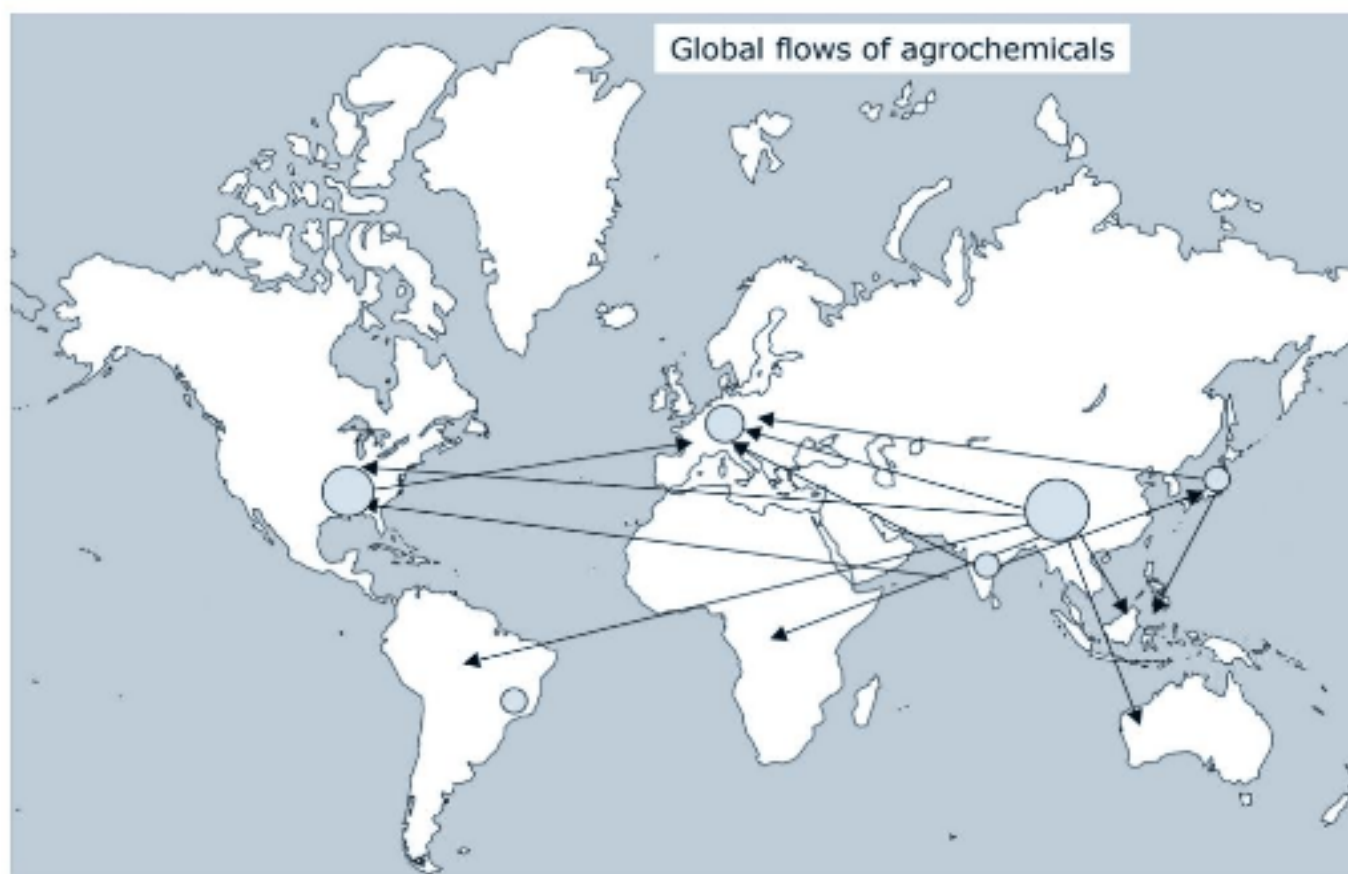


Figure 2 - Major centres of agrochemical production & trade flows

➤ manufacturing organic chemicals, it became more focussed on the agrochemical sector, where its huge pent-up demand was better able to adapt to the scale and sophistication of the government run factories built in the 1960s to the 1980s. Indian companies also benefited from the availability of a broad range of cheap intermediates and happily became very dependent on China for them.<sup>2</sup>

By the end of the 2000s, the global fine chemical industry had shifted its axis towards China (Figure 2). It was now quite clear that both India and China had been making significant inroads down the value chain, with India starting to export formulated pharmaceuticals and China becoming an ever more important source of agrochemical APIs for the global generic industry. This move downstream has continued right up until the present day, with both India supplying intermediates and even APIs to the innovative sector companies as well.

### COVID changes

As the coronavirus pandemic emerged in early 2020, shortages of the starting materials for several APIs became evident when hopes rose that some existing drug treatments might be used to treat its symptoms. Several API producers now realised that the ultimate raw material for producing their products depended upon just one or two sources, very often in China.

Politically motivated outbursts about how Europe and the US had become over-dependent on India for pharmaceuticals spurred the creation of 'national champions' in the US and France. The suggestion that France needed to be self-sufficient in paracetamol (acetaminophen), reported in the press in June 2020, was one of the more questionable announcements to have emerged.<sup>3</sup>

The growing concern that India had become too dependent on Chinese intermediates was also revealed when shortages of key raw materials and

intermediates were revealed following company closures as a result of China's pandemic lockdown.

In attempting to understand how this situation has arisen, it must be emphasised that the internationalisation of the fine chemical and bioscience industries has been largely driven by the fact that these industries serve two of the basic needs of mankind: food and good health. All governments need access to the maximum number of life-saving drugs and the benefits of the latest crop protection technologies.

However, from the perspective of the fine chemical industry, internationalisation has led to a severe decline in business in the US and Europe. In the agrochemical sector, in particular, as the industry matured, many crop treatments remained effective and innovation became targeted towards problems that proved harder to solve or where earlier solutions ceased to be satisfactory or acceptable.

## Moving East

Many hundreds of small companies in India and China now started offering competing contract research and manufacturing services at very low prices that proved irresistible to outsourcing managers. This led to reduced demand for fine chemical services from European companies, who were also contending with heavy investments to cope with ever more stringent regulatory costs.

Building large AI plants to make older, trusted products became increasingly financially viable. Detailed information on mature technologies was passed around and implemented where market demand was high. Major multinational generic producers emerged, who often sourced their extensive needs for relatively modest volumes of many active AIs from China or India.

In this way, manufacturing plants in India and, particularly, China, have been able to expand their business. More recently, even the major agrochemical companies have begun to reduce their self-reliance and outsource advanced intermediates, and even AIs, from China and India.

Often this has begun with the award of a small share of supply as a hedge against loss of capacity through accident or other unforeseen events. Unsurprisingly, innovative companies have usually preferred to invest in new products, rather than in older plants, where catching up with changing regulations became increasingly expensive.

The major campaign by the European regulators against the use of any chemical crop treatments in the EU has to be mentioned in this context, since it has certainly driven a great deal of manufacture away from Europe. Over the past ten years, some crops in Europe have become



Nematicide options are missing for several crops in Europe

so vulnerable to pests, due to the absence of suitable control methods, that farmers have stopped producing them and even exited the industry.

Examples include the current lack of nematode treatments in several crops, insecticide treatments in oilseed rape and sugar beet and, more recently, desiccants for potatoes and pulses. Importing Europe's food needs is not an option, especially when many countries depend upon Europe (and North America) for their supplies of basic food crops.

## Are we overdependent on China?

China's growing share of the production of the basic raw materials and intermediates for the agrochemical industry is a real concern. It makes no sense that one, maybe two, companies can stop the production of downstream products across the planet. However, the returns of producing these basic intermediates are too modest for European and US companies, unless they have developed a significant scale of production.

The fact is that China has taken advantage of the situation that the US's and Europe's major innovative agrochemical companies have created. The European agrochemical industry and its suppliers will continue to reduce investment in their domestic markets unless the social and political environment changes.

The prospect of Europe returning to a science-based regulatory system for

agrochemicals (and indeed chemicals in general), which balances costs and benefits in a more rational manner, remains only a remote prospect. Until this changes, investment in new products and manufacturing resources in Europe will continue to be unprofitable.

The unhealthy concentration of the major global agrochemical companies is not good for the continued dynamism of the industry.<sup>4</sup> Perhaps, as a kind reviewer of this article suggested, the industry needs some disrupters like Elon Musk! The regulatory agencies unwittingly assist the big companies in preventing new entrants from securing a foothold and thus disrupting the status quo.

In this sense, China has become a threat to Europe and the US by acquiring control of both the world's biggest innovator company and its biggest generics company. These two companies' combined sales account for one quarter of the global agrochemical market. That is concentration on an epic scale.

The COVID-19 pandemic has revealed that some major economies do not have the resilience to keep their poorer citizens properly nourished. Perhaps this natural disaster will act as a wake-up call, resulting in sounder national policies. What is eminently clear to me is that a major rethink on sourcing by the big European and US agrochemical players would not only be affordable but would improve their security of supply. One can but hope. ●

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Dr Rob Bryant

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