

BASF: AGBIO FAST FOLLOWER

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BASF has been a latecomer to agrobiotechnology. Until mid-1998, BASF continued its longstanding focus on chemicals production with massive economies of scale, in particular, but also of scope. In 2000, it announced the acquisition of the Cyanamid (crop protection) part of American Home Products, roughly doubling its agrochemicals business to join the “big four” (with Syngenta, Aventis, and Monsanto). BASF moved into plant biotechnology in 1998, describing itself as a “fast follower,” with a commitment to focus on second and third generation products. Investment in biotechnology research and development (R&D) has increased rapidly, now totaling around 20% of life sciences’ R&D.

Key Words: innovation strategy; agrochemicals; plant biotechnology.

BASF is one of the huge German-based chemicals giants that in the nineteenth century rewrote the way R&D was conducted, leading to its formalization, and to the birth of R&D led industry. BASF calls itself the largest chemicals group in the world. Overall, sales have been rising and 2000 saw record sales of 36 billion Euro. Group employment in 2000 was 103,000, of which more than half were located in Germany.

Crop protection is a relatively small but increasingly important part of BASF, seen as a less cyclical industry than the bulk chemicals parts of the corporation (table 1). BASF is strong in fungicides, fairly strong in herbicides (table 2) and espouses a vision of integrated crop protection. Herbicides focus on oilseed rape, cereals, and beets. Butisan Star (for oilseed rape) and Rebell (for sugar beets) were launched in 1994. BASF is dominant in fungicides for cereals in Europe, extending to fruit, grapes, and vegetables, including potatoes. Most innovative fungicides are based on active ingredients epoxiconazole and kresoxim-methyl.

The crop protection business has been pinpointed for rapid expansion. Other relevant strengths for its business are vitamins and animal health. Recent expenditure on crop protection R&D rose from 131 to 186 million Euro between 1995 and 1999.

Verbund—Value-added Through Economies Of Scale And Linkage

BASF’s position and path can be characterized by its articulation of a “Verbund” strategy. Verbund has both a narrow (position) and broad (path) conceptualization. The narrow version focuses on internal economies of scale. The broader version focuses on network integration. Instead of ring-fencing into core businesses, BASF has intensified its vertically integrated “verbund” strategy. The narrow notion is a direct continuation of the nineteenth century tradition of vertical integration of chemical processes,

BASF’s Verbund finds its historical roots in the integrated production system developed at the Ludwigshafen [main] site. This system, in which a few raw

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materials are transformed into a multitude of intermediates and end products through a number of product lines, was implemented at an early stage in the company's development.

The BASF Verbund is what sets it apart from other chemical companies. At Ludwigshafen some 350 different plants work together in a highly integrated system of operations...The construction of additional Verbund sites throughout the world is one of BASF's strategic goals. (BASF, 2001).

Thus, the development of Ludwigshafen, which BASF describe as "the world's largest contiguous chemical production facility," acted as the model for integration. An industry analyst contrasts BASF with other companies which have divested non-core businesses,

The technologically efficient backwards integration of BASF has become the company's real strength and competitive advantage. By combining all its technological and sourcing activities, including the infrastructure, it has succeeded in creating a unique *Verbundsystem*. It is now focusing on a permanent optimization of this BASF-specific linkage system, instead of favoring some kind of artificially-defined core businesses. (Chapman, 1999).

Table 1: BASF Crop Protection Sales By Regions - And Overall Profit (Income), In Million Euro.

	1997	1998	1999
Europe (West and Central)	655	767	736
NAFTA	584	581	609
South America	257	252	249
Asia-Pacific	75	79	51
Western Asia, Africa, Eastern Europe	70	71	100
Total Sales	1,641	1,750	1,745
Total Income		203	195

Note. From "Information from BASF Company Website," by BASF, 1999. Mount Olive: BASF. Available on the World Wide Web: http://www.basf.de/basf/html/rampe/home_e.htm.

Table 2: BASF Crop Protection Sales By Product Group In Million Euro.

	1997	1998	1999
Herbicides	980	958	900
Fungicides	446	529	549
Others (including insecticides)	214	263	296
TOTAL	1,641	1,750	1,745

Note. From "Information from BASF Company Website," by BASF, 1999. Mount Olive: BASF. Available on the World Wide Web: http://www.basf.de/basf/html/rampe/home_e.htm.

To this relatively "narrow" though powerful conception, BASF has added other "broader" elements as well, including knowledge. Here again the concept seems to evolve from the power of concentration. Of the 10,000 or so R&D employees, 8,000 are located in Ludwigshafen, and 1,300 in the company's central R&D laboratory,

A know-how Verbund has also developed by concentrating activities at a single site. Advances in communication technology make it possible for employees to share their knowledge with colleagues around the world...BASF research labs are networked, and they work closely with the various divisions. (BASF, 2001).

BASF operates a very tight, centrally located, but well networked research system. The concept “knowledge Verbund” involves the idea of fusion of scientific and technological competencies. Further, other partnership and co-operation issues have been integrated into the Verbund concept,

BASF's Verbund also includes building and maintaining long-term relationships with business partners and communities in which the company is active. An important goal here is to combine the strengths of BASF with partners to achieve even greater economic and ecological efficiency. (BASF, 1999b).

The Verbund approach has been continued and intensified along with BASF's globalization,

Expanding the network of Verbund sites in major economic regions of the world is particularly important to BASF's globalization strategy...BASF is also pursuing the same strategy in Asia. A Verbund site is under construction in Kuantan, Malaysia, and a second site is planned for Nanjing, China. (BASF, 1999b).

And other sites are planned or under construction in Mangalore (India), Altamira (Mexico), and Guaratingueta (Brazil).

Expansion Through Acquisition

The more important acquisitions in crop protection started with Sandoz US and Canada Corn in 1996, as a response to the growth in herbicide tolerant crops. In 1998, BASF acquired the second biggest crop protection generics company Microflo. It also bought a 40% share in the Swedish based seeds company Svalöf Weibull and integrated its plant biotech research into a new company BASF Plant Science (see below).

The acquisition of Cyanamid in 2000 increased BASF crop protection sales to US\$ 2.8 billion in 2000. It will expand BASF in North and South American markets and add “an established and proven line of insecticides.” Cyanamid is a leader in non-transgenic herbicide tolerant cropping systems. It says it works with various seed companies around the world on both transgenic and non-transgenic crop production systems. It has agreements with Monsanto for joint use of Roundup with its own products.

Research And Development

BASF sees its key R&D strength as its R&D concentration in Ludwigshafen. The Central R&D Lab is the important source of research synergy between the different elements of the life sciences. Inside it “sit together chemists, biologists, mathematicians and IT specialists.” BASF describes this “highly concentrated unit” as “the strongest brain-pool in chemistry and chemistry-related disciplines in Europe.” (Gerling, 2000).

In crop protection, the main research center is located in Limburgerhof, but another research center is also located in Raleigh, in the United States (US). Then there are experimental stations in Campinas, Brazil; Dinuba and Greenville in the US; Utrera in Spain; Nelspruit in South Africa; Taipei in Taiwan, and Ebina in Japan.

Plant Biotechnology—Fast Follower

BASF has made a relatively late entry into plant biotechnology and is aiming to move directly into second and third generation products. Its strategy includes large investment in plant biotechnology, more than 700 euro (\$US 640) over ten years from 2000.

This is a long-term strategy and the new business will take 10-15 years of up-front investment and major research before it is fully operational.

Plant biotechnology is an up-and-coming, attractive field for us. It provides us with additional growth opportunities in the new agromarket that is arising from the increasing coalescence of crop protection, seed production and plant biotechnology. We are going to firmly seize these opportunities.

We intend to become one of the major players in plant biotechnology. The additional funds and the organizational reconfiguration will help us to achieve this goal more rapidly. (Strube, 2000).

BASF articulates its strategy to focus on second and third generation biotechnology products,

The first generation of genetically modified plants is already on the market. These are plants that are, for example, resistant to herbicide or harmful insects. These first products of plant biotechnology are not attractive to BASF. The reasons for this are: first, our product range does not include any total herbicides, and second insecticides are not a core sector of our business. Now, however, the second and third generations of plant biotechnology are starting. In laboratories, plants will be produced that, on the one hand, have better cultivation properties and, on the other hand, contain improved constituents.

A relatively new creation is BASF Plant Science. This is part of the Crop Protection Division but is run independently to speed up decision-making processes and increase flexibility. The vision in plant science is to go beyond crop protection to link to the whole food chain supply system.

BASF Plant Science has been set up as a “research and information platform,”

BASF Plant Science will assemble...an efficient research and information Verbund...This Verbund will be supplemented by the research co-operations that we have with external research institutes...The in-house research of both BASF and the plant breeding partners in the field of plant biotechnology will in future be coordinated by BASF Plant Science and work on its behalf. (Vogel, 1999).

Plant biotechnology R&D targets set by BASF are as follows,

- To provide R&D for production increases via pest resistance and increased stress tolerance.
- To provide R&D to increase volumes via increases in content of oils, proteins, and carbohydrates in crops.
- To provide R&D for specialty products via modification of plant constituents (vitamins, fatty acids and enzymes).

Conclusions

BASF is one of the big four crop protection companies worldwide with sales of around US\$2.8 billion in 2000. Research and development expenditure has risen significantly in recent years to

around 11% of sales in 1999. BASF is strongest in fungicides, fairly strong in herbicides, and an important player in vitamin production.

BASF articulates a strategy based on Verbund. This strategy has both a narrow and a broader conceptualization. The narrow concept related to internal production and energy integration and economies of scale. More broadly, the company espouses a notion of Verbund that aims at more general network integration. “Know-how Verbund” involves the notion of fusion of different scientific and technological competencies. BASF has commented that synergies are not everywhere but they exist in its current businesses. It appears that the main laboratory is an important source of synergy.

BASF aims to become one of the top agrobiotechnology companies. Investment in biotechnology R&D has increased rapidly, now totaling around 20% of life sciences R&D. The company made a relatively late entry into plant biotechnology and articulates an aim to move directly into second and third generation plant biotechnology. BASF describes itself as a fast follower. BASF has integrated all its plant biotechnology R&D into a single unit (BASF Plant Science GmbH) with locations in Germany, Sweden, and the US. Much of its investment involves joint ventures with university departments and public research institutes.

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