1966 – 1996
Growing international markets

The **internationalization** of agricultural markets poses **new challenges** to research and work in Limburgerhof. In order to meet different climatic and agro-structural conditions, a **global network** of **BASF research stations** is created. International and interdisciplinary teams of researchers work together to develop new active ingredients. Three **landmark products** – Basagran®, Basalin® and Pix® – come on the market, strengthening BASF's position in the international crop protection market.

History

1966 marks a **watershed year** in which the world is torn between stagnation and change. **Young people** rebel against the norms of the state and society. The **Woodstock Festival** in 1969 becomes the musical **high point** of the **American hippie movement**.

The **United States wins the space race** when **Apollo 11** lands **on the moon** on July 21, 1969.

Willy Brandt's genuflection in Warsaw on December 7, 1970, becomes a powerful symbol of the request for forgiveness for German crimes committed in the Second World War. Brandt receives the 1970 **Nobel Peace Prize** for his pioneering **"Ostpolitik"** (eastern policy).

Until the 1973 oil crisis, **Japan** experiences an unprecedented **economic boom** and is included in the group of the G6 countries in 1975.

The **reactor disaster** at **Chernobyl** on April 26, 1986, is considered to be the **worst nuclear power plant accident** in history. In Germany, it prompts **discussions** about the gradual **phasing out of nuclear power** in the coming decades.

The **fall of the Berlin Wall** on November 9, 1989, leads to the **reunification** of Germany on October 3, 1990. This brings an **end to the Cold War**.

Nelson Mandela and **Frederik Willem de Klerk** share the 1993 **Nobel Peace Prize**, and in 1994, Mandela becomes the first black **president of South Africa**.

Expanding horizons –
from the United States to Japan and Brazil

With its wide-open fields, advanced machinery and modern agriculture, from the 1960s onward, the **United States** was an extremely **attractive market** for BASF's Crop Protection products. But corn, soybeans and cotton pose different demands than wheat and sugar beets, and fundamental differences existed in the **agro-economic structures around the world**. Through its network of research stations, BASF gained expertise in local climates and crops as well as **agro-economic conditions**. The company later developed other interesting markets using similar methods. **Japan**, an industrial nation, has only a very small amount of arable land and has to make the best use of this through intensive management. Today, thanks to its size, growing economic power and **innovations in agriculture**, **Brazil** has particularly great potential.

Ebina, Japan

Campinas, Brazil

Pingtung, Taiwan

Research Triangle Park, United States

Expansion of a successful model – the global research stations

Crop protection products such as the beet herbicide Pyramin®, which sold well outside of Germany, fit the corporate strategy. In the mid-1960s, BASF further strengthened its international orientation. The establishment of a subsidiary in Belgium (1964) and, in particular, the construction of production facilities in the port area of Antwerp served to realize the plans for a "second Ludwigshafen," a second major Verbund site.

From 1967, in addition to manufacturing an important fiber for plastics production, this facility also produced Nitrophoska. Production of this fertilizer that was originally developed in Limburgerhof had almost doubled again since the late 1950s and was reaching its limits in Ludwigshafen. The new plant site on the Scheldt estuary was ideal since raw materials for the production of Nitrophoska arrived daily at the port of Antwerp and the large quantities of fertilizer produced could be shipped via the North Sea quickly and economically throughout the world.

After BASF joined with the U.S. chemical company Dow in 1958 to found the Dow Badische Chemical Company to produce raw materials, the focus turned increasingly to the U.S. market. There were also good sales opportunities for crop protection products there, but Limburgerhof employees had been mainly focused on the problems of European agriculture. In order to win over the American farmer, BASF had to research the local climatic conditions and their particular challenges, especially those relating to cotton, corn and soybeans.

Limburgerhof was the inspiration when BASF built its second research station in Greenville, Mississippi, on a site covering 57 hectares in 1966. Many methods and standards were transferred from Limburgerhof, but Greenvillle provided the first opportunity to field test active ingredients in a subtropical climate. Experts from Germany, who had studied in the United States and understood the agricultural business there, supported the development by establishing contacts with farmers and research institutions. However, as with Limburgerhof, product development required both expertise and perseverance.

The growth in international business in the late 1960s was remarkable, but was mainly due to successes in Europe. BASF had maintained a presence in Spain, for example, since 1968 with a production site in Tarragona, near Barcelona. In 1969, the company opened a 30-hectare research station in Utrera, in the agrarian part of southern Spain. Research was also intensified in other parts of the world. In that same year, BASF opened its first research station in the southern hemisphere, in Nelspruit, South Africa. Another research facility followed in 1970 in Taiwan. A network of research stations now stretched over four continents and included several climate zones and the relevant local crops. In temperate climates, experiments could be carried out year-round.

Having a local presence in many regions also had other advantages, especially in the registration of new products. In 1969, BASF acquired U.S.-based Wyandotte Chemicals and founded the company BWC (BASF Wyandotte Corp.). At the time, the purchase marked the largest single investment by a German company in the United States, and the price of 100 million deutschmarks made headlines. BASF now had two plants, one in Wyandotte, Michigan, and one in Geismar, Louisiana. These produced basic chemicals as well as a broadened range of higher-value products. The possibility of manufacturing crop protection products in Geismar offered a good opportunity to enter the lucrative U.S. market, but the company lacked a range of promising products at the time.

The production site in Tarragona under construction in the late 1960s (left) and today

The new location in Antwerp was logistically ideal – starting in the mid-1960s, raw materials entered by ship and fertilizers were distributed all over the world

Different countries, different cultures – new ideas for new markets

Worldwide, the foundation had been laid for the internationalization of BASF's fertilizer and crop protection business. Additional plans came together at the headquarters in Limburgerhof, including at the annual "Autumn Research Meeting." When the stations presented their findings there, lively discussions followed. Which active ingredients were successful under which climatic conditions and on which crops? What approaches were promising, and which active ingredients needed to be registered?

Ideas evolved into projects, and research led to products. In the 1970s, a number of groundbreaking crop protection products consolidated BASF's market position. It began in 1974 with the selective herbicide Basagran® (bentazone). Ten years' work went into the product's launch, and as a grain herbicide, it had excellent prospects worldwide. When employees of the research station in Greenville observed that bentazone could also be used in subtropical plants such as rice and soybeans, it quickly became apparent that Basagran® had a lot of potential, especially in the United States.

From the end of the Second World War, soybean production had increased sixfold and the agricultural policy of President Nixon (1969-1974) called for further intensification with the mantra "Get big or get out."

The post-emergence herbicide Basagran® was used for the first time in 1975 for targeted application in soybeans. Since that time, it has allowed farmers in the U.S. Midwest to reduce tillage and plow less, thus contributing to erosion control; it also made it possible to seed soybeans in narrower row spacings. These and other advantageous properties helped Basagran® become BASF's most successful crop protection product in the years that followed, and its success was global. Basagran® led to the breakthrough in the U.S. market.

Limburgerhof, as the headquarters of the agricultural division, was on the rise. In 1974, another station was opened in Ebina, near Tokyo, in order to serve the small but very attractive Japanese market. BASF also saw good opportunities in Brazil, which was greatly expanding its soybean production with government assistance. In 1976, the company opened a research station in Campinas, near São Paulo, which conducted research primarily on citrus plants, coffee, cocoa and sugar cane.

But there was far more happening locally than just field trials. BASF employees gained insights into local agro-economic structures, which in turn influenced marketing and sales. For example, Japanese rice farmers, who worked on small areas but received high prices for their products and accordingly invested heavily in crop protection, had significantly different expectations than South American farmers, who cultivated corn, soybeans and cereals on huge fields.

The worldwide success of Basagran® was supplemented in 1976 by a herbicide for use on peanut and cotton crops. Basalin® (fluchloralin), like Basagran®, was produced in Louisiana and helped consolidate BASF's position in the crop protection market internationally and especially in the United States. In cotton cultivation, the growth regulator Pix® (mepiquat chloride) was a major success from 1980 onward. The use of the substance meant that the tufts matured evenly – a crucial requirement for mechanical harvesting. Crop protection thus made a contribution to the more efficient management of cotton. With Pix®, BASF scored another success in the United States on its way to becoming one of the leading companies in agro-chemicals there.

Within a few years, some outstanding products, especially herbicides, brought the division considerable success – in Germany as well. The launch of Butisan® (metazachlor), approved in 1981, brought a herbicide to the market that was particularly useful against weeds in rapeseed. Butisan® quickly gained acceptance as the cultivation of rapeseed expanded in numerous locations, including in West Germany. New hybrids were suitable for the production of cooking oil, and

Basagran®: one of the first post-emergence herbicides in soybeans

The growth regulator Pix® made the mechanical harvesting of cotton possible

rapeseed later gained in importance as a renewable resource. In addition to herbicides, the fungicide Ronilan® (vinclozolin) – approved in Germany in 1976 and in the United States in 1981 – became an important addition to the crop protection portfolio. It was particularly used in vineyards and other specialty crops as well as rapeseed in order to control fungal diseases such as gray mold, scelotinia and monilia.

New technologies and measurement techniques allow for broader research beginning in the mid-1970s

New tasks in crop protection – expanded research for forward-looking products

A change was underway in crop protection: In addition to chemistry, the fields of biology and ecology began to gain greater importance in the laboratories and fields. Increasing social criticism created the incentive for more intensive, wider-ranging research.

A laboratory for residue analysis and environmental research was opened in the early 1980s. BASF was thus well prepared for the amendments to the German Plant Protection Act in 1986, which required manufacturers of crop protection products in West Germany to perform extensive ecotoxicological tests. Is the product environmentally friendly? Or does it impact drinking water? How does it affect soils, animals and people living near agricultural land? Crop protection had to be reconciled with the increased expectations for ecological requirements; this gave the research department plenty to do.

From a business point of view, it also made sense to increase investment in crop protection research because the fertilizer business, for decades the focus in BASF's agricultural department, was suffering from oversupply and a global decline in prices.

In the mid-1980s, Limburgerhof devoted 80 percent of its research spending to crop protection in order to boost the traditionally strong herbicide group and to advance the development of fungicides. In the fertilizer business, there were still quite profitable lines of business, such as products for horticulture and fruit trees sold by the subsidiary Compo. This company, which was founded in 1956 to distribute an "original Dutch flower composting soil," had belonged to Kali und Salz AG since 1972 before being acquired by BASF in 1986. Thanks to major investments by the company, Compo had a strong position in the consumer segment. With regard to agriculture as a whole, however, the growth potential in crop protection was now considerably larger.

With Compo, BASF was able to offer a wide product range in the consumer segment

During the 1980s, the ratio between fertilizer and crop protection shifted, not just in terms of research, but also in earnings.

The starting point for successful product development in crop protection remained BASF's main laboratory in Ludwigshafen, where chemists synthesized substances in specialized working groups that focused on developing new active ingredients in, for example, herbicides or fungicides.

Ludwigshafen and Limburgerhof worked very closely together to develop crop protection products from these substances. The Research Triangle Park (RTP) site near Raleigh, North Carolina, also became very important to the company's research activities.

Numerous international companies employed thousands of researchers in the prestigious research park, which at the time was the largest of its kind in the world. BASF also invested in a new facility here to develop agricultural products.

Crop protection and ecology

Smog, loss of forests and **acid rain** – in the 1970s, there was a broad public debate about **environmental pollution**. The Western European chemical industry was also the subject of **criticism**, and the **crop protection industry** in particular was fighting to maintain its **reputation**. Views changed, and the idea of **integrated pest management** took hold. Like other manufacturers, BASF increasingly combined biological, biotechnical, physical, chemical and plant breeding methods as well as planting techniques.

The pinecone cap mushroom (Strobilurus tenacellus) produces strobilurine A as a defense against its competitors for food – other fungi

Following nature's example

Fungi synthesize substances to ward off enemies, and therefore provide an inexhaustible **potential** supply **of natural compounds** that can be used in the development of active ingredients. Fungicide experts in the main laboratory and in Limburgerhof took advantage of this system to develop the **strobilurine** chemical class. **Dr. Hubert Sauter** and **Dr. Klaus Schelberger** of BASF were nominated for the German Federal President's Future Prize for this groundbreaking discovery in 2005.

Perseverance, narrow lead – milestones in crop protection

The potential of crop protection was obvious, but the question was how to use it. The old "spray and pray" adage still prevailed. Thousands of substances had to be tested to find one active ingredient, but the methods used to turn this compound into a market-ready product were becoming increasingly complex.

Electronic data processing had accelerated some processes and allowed for larger quantities of data to be studied. In addition, a "method book" for the field tests at all the research stations had been introduced in order to better compare research results and speed up product development. A major key to success lay in the interdisciplinary approach. Teams of agronomists, biologists, biochemists and chemists worked in laboratories with biochemical methods. They optimized the testing systems and increasingly took aspects of plant physiology and molecular biology into account.

One of the first results of this intensive research was Opus® (epoxiconazole) in 1993. The product, marketed as the "top fungicide," soon became one of the most successful products of BASF's Crop Protection division. Farmers in Europe have been using it on all types of grains since then. When coffee rust hit South America, products containing epoxiconazole were developed to meet the specific growing conditions there. The result was a fungicide that could be used effectively to treat coffee rust and, later, to control soybean rust. Fenpropimorph provided BASF with an additional active ingredient to create compound mixtures with new formulations. These proved increasingly effective in controlling a range of fungal diseases. One example of success in this area is the fungicide Opus® Top, a combination of fenpropimorph and epoxiconazole, which acts both preventatively and curatively thanks to the substances' different modes of action. BASF's new products to treat fungal diseases helped make the company one of the leading fungicide manufacturers worldwide.

While Opus® was a great success, research on strobilurine A continued. However, at that time no one could have known what other extremely successful products would result from this research. As in many other cases, the work on strobilurines involved constant contact and exchange with leading universities.

Electronic data processing accelerated many processes and simplified international data comparison

Part of BASF's crop protection program since 1993: Opus®, the "top fungicide"

Prof. Timm Anke, a biologist at the University of Kaiserslautern, had discovered the antifungal substance contained in the pinecone cap mushroom, a woodland fungus. Prof. Wolfgang Steglich of the University of Bonn had described the structure of strobilurine A. Experts from the main laboratory had been working since the early 1980s to develop a fungicide from this naturally occurring substance used for defense. Researchers altered its structure and used rapid biological tests to analyze more than 18,000 synthetic variants until the effective one was discovered in 1985. Another chemical company was also working on strobilurines. It became a veritable race to get the patent – a race that BASF won by just two days in 1987. After carrying out further studies, BASF researchers synthesized the fungicidal active ingredient kresoxim-methyl for the first time. But several more years passed before it was ready for the market.

The efforts in ecotoxicological research led to another important product in 1994. With the development of Rebell® (quinmerac/chloridazon), Limburgerhof had a particularly effective beet herbicide that also had a favorable environmental profile. Rebell® gained acceptance as an inexpensive solution to control weeds. As with Pyramin® 30 years earlier, Limburgerhof had given beet cultivation a major boost.

In March 1996, years of research and testing came to a successful conclusion: The active ingredient kresoxim-methyl was approved for grains in Germany and Belgium. The first synthetic strobilurine fungicide marked a milestone in fungicide research. Chemistry trade journals even referred to it as the most important discovery of the 1990s. Farmers could use this active ingredient in very different crops, such as grains, grapes and vegetables, as well as in different mixtures. Products like Stroby®, Allegro® and Juwel® quickly gained wide acceptance. The active ingredient breaks down within a short time into biologically inactive acids and does not endanger bees, beetles or other beneficial insects. Kresoxim-methyl put BASF in the lead in strobilurine research and significantly strengthened its position in the global market for fungicides.

The new active ingredient gave the entire division a tremendous boost. A manufacturer that had only begun focusing entirely on crop protection just 10 years earlier had now become a leading provider. Strobilurines were yet another success for the company's thriving Crop Protection division.

The story of the Donner family – father Johannes and his daughters Christina and Katja – is representative of many similar family histories centered around the Agricultural Center Limburgerhof. The family's passion for agriculture, both professional and personal, has been passed on from generation to generation.

Born in Düsseldorf, Johannes Donner discovered his enthusiasm for agriculture on his uncle's family farm in the Sauerland region (North-Rhine Westphalia), where he grew up during and after the Second World War. These experiences inspired and motivated him to later take up the study of agriculture in Bonn. Johannes Donner gained his first professional experience as a post-doctoral research associate at the Institute for Rural Engineering at the Technical University in Berlin. He applied for a position at the Research Station Limburgerhof based on a recommendation from one of his fellow students in Bonn, Dr. Herbert Bohle, who would later become head of the Rehhütte Farm Estate.

Katja Schweikert and Johannes Donner describe their interesting work in the Crop Protection division

The Donner family in the 1970s: Father Johannes and mother Jutta with their daughters Christina (left) and Katja (top left image)

Johannes Donner giving advice at the demonstration field in the mid-1970s in Limburgerhof (lower left image)

Family connections – rooted in agriculture

In 1968, Johannes Donner started working for BASF's branch office in Cologne. After a year of intense training, he became an advisor in the North-Rhine area around Cologne. At the time, Donner only came to Limburgerhof for the annual meetings of the advisory offices and the research meetings, where all the advisors participated in lively discussions about future product developments. "Even then we had a very solid product portfolio, with Pyramin® in beets, Cycocel® in wheat and Calixin® against mildew," says Donner, recalling his very interesting first years at BASF. To him, the key to success lies in the combination of compelling products with a competent advisor who can serve as a trusted contact person for the farmer. "Life as an advisor was always exciting. The direct feedback I received from farmers let me know right away if a product was successful or unsuccessful." One of his colleagues had an unusual experience during the regional launch of the growth regulator Cycocel®. "BASF had its usual huge demonstration fields. There were violent thunderstorms the day before the Corpus Christi procession. Almost all the fields were affected by lodging, and only the plots treated with Cycocel® were still standing. After the procession was over, the participants went to the demonstration fields together

His daughter Christina now lives her passion for agriculture on the family farm

to admire the excellent results," he recalls, still laughing at one of many amusing episodes.

Donner soon reaped the benefits of his experience and expertise in advisory services and product development. He assumed leadership positions in the company, serving from 1974 to 1978 as Director of Advisory Services and Development for Germany, and from 1978 to 1981 at the international level as Director of European Advisory Services. Then, Johannes Donner gained a global overview of agricultural structures from 1981 to 1988 as Director of Market Services in crop protection marketing. In 1988, he was named Global Marketing Director for crop protection, a position he held until his retirement in 1998. His 30 years of experience at BASF makes him optimistic about the future of agriculture. "But it's a shame that Europeans have emotional barriers to new technologies. I am sure professional farming is on the right track, even if political conditions in Europe could be better."

His job frequently kept him on the road, leaving him little time for his family. "My older daughter Christina once called me uncle because I was so rarely home." Nevertheless, his two daughters Christina and Katja never wanted anything more than to follow in their father's professional footsteps. "In a very real sense, I grew up with BASF," says Katja (whose married name is Schweikert), remembering her childhood. BASF's international guests often came to dinner at the Donner house, and many became friends of the family. Agriculture and BASF remained frequent topics of conversation in the Donner household. It is no wonder, then, that both daughters wanted to study agriculture just like their father. Before starting her university studies, Christina completed an apprenticeship at the Rehhütte Farm Estate, where she met her future husband, who happened to be an intern there. After working as a BASF advisor in the Hanover region, today she and her husband Hans-Christian run a 300-hectare family farm in North Friesland. Her sister Katja took a job at BASF in 2001 in order to return to the area where she grew up. Today, she has now put down roots in nearby Altrip and works at the Agricultural Center Limburgerhof in the area of web content management. She has managed to balance her family and career at BASF far better than was possible when her father was working. "I now work part-time, mostly in my home office, and that gives me time to take care of my three sons. I really appreciate my situation." But her father Johannes also appreciates his good fortune in having been able to turn his hobby into a profession. Agriculture is still his passion today. Several times a year, he visits his son-in-law's arable farm with pig and cattle operations. Looking back, he says: "My 30 years at BASF were a wonderful time. And now I have a lot of time for my family."

A strong team: Katja Schweikert and her sales colleagues in 2005