InnoPlanta
Nordharz/Börde

Insights gained from the 2004 Test Crop

Coexistence of Genetically Modified and Conventional Corn

November 2004

Background

In 2004, genetically modified corn was cultivated on acreage of more than 19 million hectares worldwide alongside (in coexistence) with conventional species. In Germany as well, genetically modified corn has been cultivated (on limited areas) for seven years.

With this year's test crop, the information already available from French and Spanish studies on the coexistence has been scientifically confirmed in practical terms. In this context, it was in particular the diverse agricultural structures within Germany that were taken into consideration. The results presented thus create a solid basis to ensure a real choice to select from, for the agricultural economy and the entire market chain.

Objectives of the Test Crop

- Evaluating the efficiency of measures having practical impacts to ensure coexistence
- Development of cultivation recommendations for the farming community

Questions concerning coexistence deal with economic impacts that the cultivation of Bt corn could have, for directly adjacent neighbors, as a result of the introduction of significant genetic matter from one crop into another (in this instance, genetically modified into conventional). In the context of the test crop, introductions into adjacent conventional corn crops were measured and the efficiency of possible isolation measures was reviewed.

The test crop does not address questions regarding the safety of genetically modified corn. This was extensively reviewed in advance and positively evaluated. Independent scientists and state authorities as well as the experience already gained from the worldwide extensive cultivation have confirmed that Bt corn does not have any negative impacts on human beings and the environment.

Participating Parties

Participating in the test crop were both private farmers as well as the institutes for agriculture of the German Federal States Bavaria and Saxony-Anhalt with suitable areas and scientific resources.

InnoPlanta e.V. “Biotechnologie Nordharz/Boerde” in Gatersleben and the *Bundesverband Deutscher Pflanzenzuechte*r (BDP, Federal Association of German Plant Breeders) coordinated the crop.

The corollary scientific work and evaluation of the experiments was performed by the *Institut für Pflanzenzuechtung und Pflanzenschutz* (Institute for Plant Breeding and Plant Protection) at the Martin Luther University in Halle-Wittenberg with the participation of the Federal Statea institutes for agriculture in Bavaria and Saxony-Anhalt and the *Verein zur Foerderung Innovativer und Nachhaltiger Agrarbiotechnologie e.V.* (FINAB, Association for the Promotion of Innovative and Sustainable Agricultural Biotechnology) in Rostock.

The plant breeding companies Pioneer Hi-Bred Northern Europe, Monsanto Agar Deutschland GmbH and KWS SAAT AG provided the seeds as well as a financial co-funding for the corollary scientific work. Participating in the communication measures or, respectively, the financial funds required for this were additionally Bayer CropScience, BASF Plant Science, Syngenta and Deutsche Industrievereinigung Biotechnologie (DIB, German Association of Biotechnology Industries).

The *Bundesministerium für Bildung und Forschung* (Federal Ministry for Education and Research) and the government of the Federal Stete of Saxony-Anhalt ensured the co-financing for the scientific investigations.

The government of the *Land* of Saxony-Anhalt as well as the agricultural ministries of Bavaria and Mecklenburg-Pomerania actively supported the project.

Characteristics of the Corn Species Used

In the test crop, so-called Bt corn of the MON810 line was used, which features a genetically engineered resistance against the European Corn Borer (ECB).

In Germany already more than one quarter of the corn acreage (that is, approximately 400,000 hectares) are infested by the ECB. The pest is showing a clear tendency to spread to the north. In addition to Bt corn, control options include soil treatment measures, insecticides or Trichogramma wasps.

Controlling the ECB by means of insecticides proves to be difficult since the hatching larva quickly bore into the stem and can mature there in safety.

Timing is also crucial for succeeding in controlling measures by means of Trichogramma wasps; the wasps must be released in perfect coordination in order to achieve the largest possible effect. In addition, losses due to parasites and storage losses have to be taken into account.

In Bt corn, a gene from the widely occurring soil bacteria *Bacillus thuringiensis* (Bt) was transferred to the corn plants by means of genetic engineering. Microbial Bt preparations have already been applied for some time now in organic farming as biological pesticides.

The Bt corn produces the Bt agent itself and thus protects itself from the inside against the European corn borer. As a rule, with the deployment of Bt plants, chemical treatments can be completely dispensed. Furthermore, only the specific pest is controlled while beneficial insects are not affected at all. As a result, the farmer has clear economic advantages to be gained from the corresponding Bt varieties.

Since its introduction in 1996, Bt corn has already been cultivated worldwide on acreage of more than 34 million hectares.

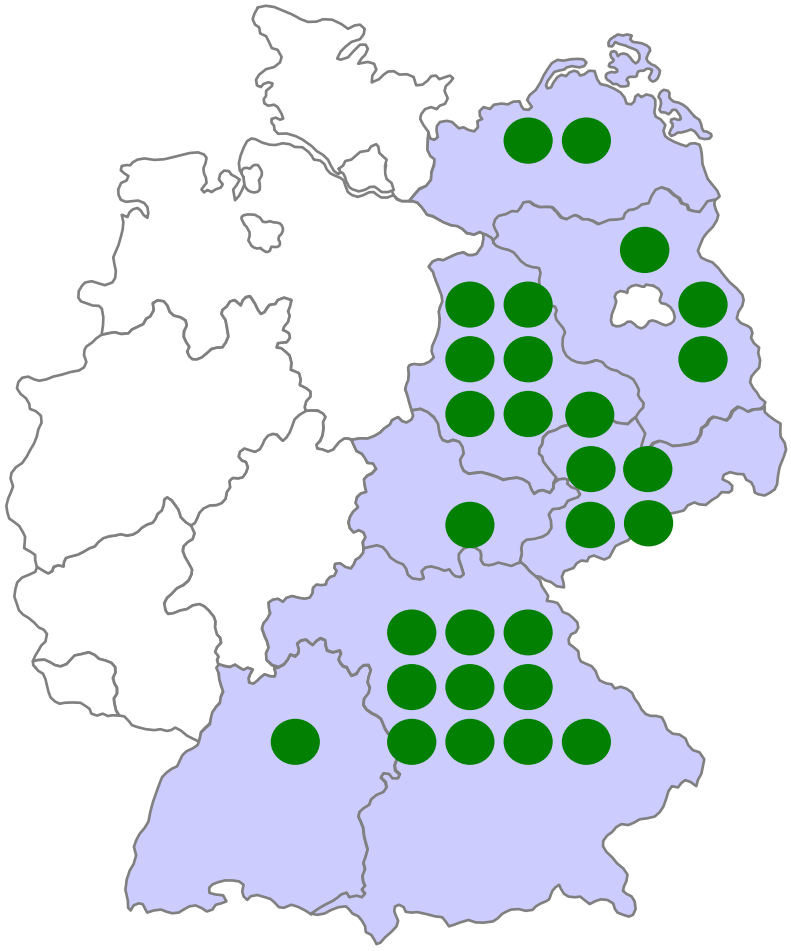
Scope and Cultivation Layout

The layout of the crop is based on the insights gained in extensive field experiments that have been performed in Germany by the *Biologische Bundesanstalt für Land- und Forstwirtschaft* (BBA, Biological Institute for Land and Forest Economy) as well as in various European countries.

According to this, the pollen discharge of corn crops only contributes in any meaningful way to the pollination of surrounding corn crops if it occurs over short distances. Measurements performed in Spain have demonstrated that conventional grain corn crops no longer exhibit introductions from a foreign pollinator, which would require labeling rules to be enforced (*kennzeichnungspflichtig*), and this already at a distance of less than 20 meters from the neighboring GMO cornfield.

This year's test crop was designed in such a way that all areas included in the investigation were located within the same agricultural operation, respectively. With this measure it was guaranteed, in the context of precautionary measures, that no neighboring crops of conventional corn directly bordered a Bt cornfield.

The test crop was performed at 30 locations in seven Federal States (Baden-Wuerttemberg, Bavaria, Brandenburg, Mecklenburg-Pomerania, Saxony, Saxony-Anhalt, Thuringia; c.f. Overview 1). Here on a total of approximately 300 hectares, Bt corn was cultivated; this corresponds to 0.02 percent of the corn cultivation fields in Germany (ca. 1.5 million hectares). At 28 locations extensive data could be collected.

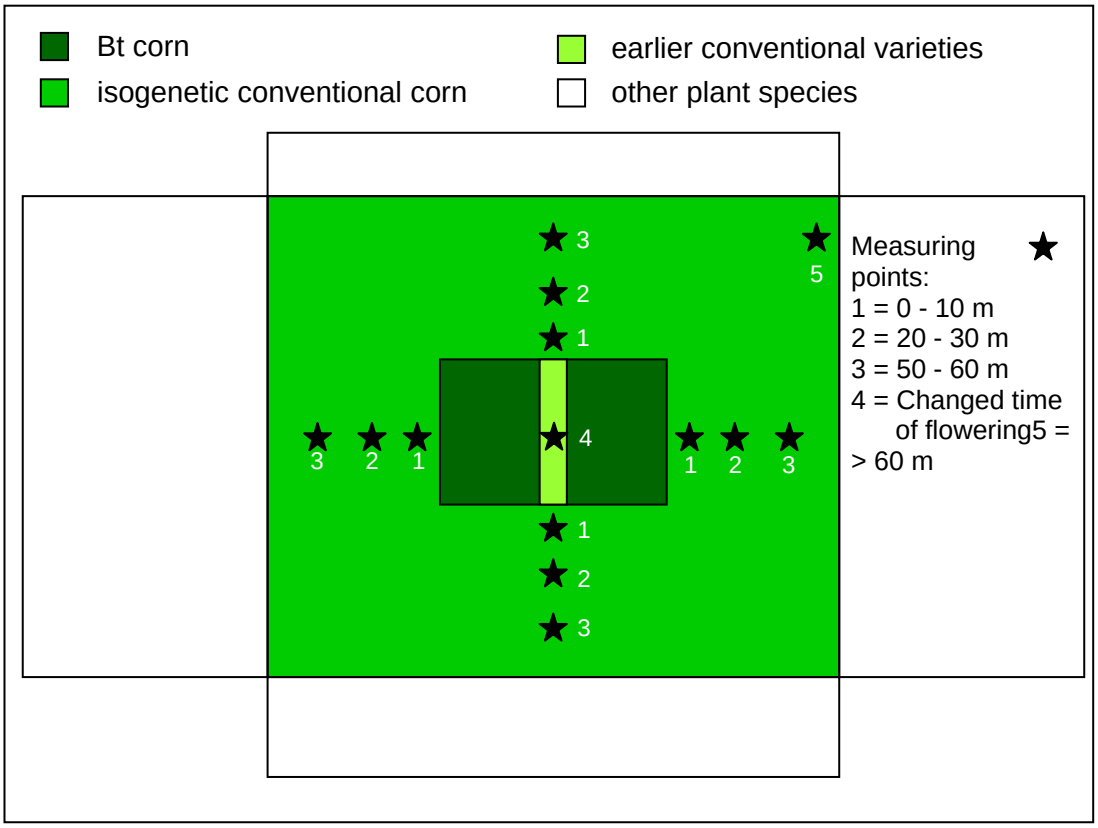


Overview 1: Participating Federal States

Number of locations

The project involved a program aimed towards agriculturally operated areas which, using real conditions, emulated cultivation and usage situations given when fields are directly adjacent to one another. For this purpose the center plots of Bt corn, which ranged from sizes of 1 to 20 hectares were completely surrounded by a border zone of conventional corn (minimum width 60 m; c.f. Overview 2). In this zone, the actual hybridization – induced by pollination – of the genetically engineered characteristic was determined while operational, regional, climatic and flourishing biological particularities were also taken into consideration.

In order to facilitate an evaluation applicable to all locations, the requirements for the cultivation design were identical for all locations.



Overview 2: Depiction of the Cultivation Layout

Utilization

The harvests from all locations participating in the test crop were used as feed within the agricultural operation.

Corollary Scientific Program

With the help of the corollary scientific program, a well-founded database of scientific data on the possible introduction of the genetically modified trait into neighboring harvest batches could be compiled, under real-life conditions and taking into consideration regional and operational structures.

The various locations were planned according to identical requirements, investigated and evaluated during the vegetation period. In each of the three Federal States (Bavaria, Mecklenburg-Pomerania and Saxony-Anhalt), one additional location was chosen at which additional issues were addressed (intensive locations).

During the season, the flowering period of the various corn species as well as climate information was collected. In order to do justice to the conditions of a practical cultivation, samples were taken from the harvest quantities (corn silage or grain corn). The test occurred in predetermined distances to the center plot planted with Bt corn (cf. Overview 2).

In a number of experiments the impact of flowering discrepancies as a result of the incorporation of differing varieties and sawing dates was additionally investigated.

In addition to this, in Bavaria honey and pollen samples were taken from beehives placed close to the experiment fields in order to investigate the introduction of corn pollen by bees and the quantities of gm traces.

All harvest samples were analyzed with the assistance of a quantitative PCR analysis for genetically engineered components.

On the basis of the results available thus far, which were collected from six corn silage locations, it has become apparent that the share of GMO traces in harvest samples from conventional corn crops directly bordering the Bt corn decreases rapidly as the distance to the Bt corn increases. Significant GMO introductions (above 0.9 percent) were primarily determined within a 10 meter wide strip directly bordering the Bt corn. Harvest samples from a larger distance (20 to 30or 50 to 60 meters) as a rule exhibited lower GMO traces.

Changing flowering periods in order to prevent GMO introductions could not be realized. The results of the investigations concerning the introductions into the honey are not yet complete.

Recommendations for Good Agricultural Practices

The provisional results from the test crop have shown that co-existence in the cultivation of genetically modified and conventional corn is feasible in Germany. With this conclusion, the scientific information already available from Spain, France and Germany was confirmed in commercial terms.

In the course of planning plantings, corn growers should assume that harvest batches of conventional corn that were harvested from a 10 meter wide border strip directly adjacent to a Bt corn field would be required to be labeled as genetically modified. In the case of larger distances, it can be assumed that the GMO content will be lower than the labeling threshold value of 0.9 percent.

In the case of larger conventional corn fields, the GMO content of the border strips is irrelevant as concerns a labeling requirement; in the case of harvest batches from such fields, there is generally no obligation to label the product(s).

Farmers that assume to cultivate GMO corn directly alongside conventional corn can thus be advised to design their fields by surrounding the GMO corn with a separating strip of conventional corn 20 meters in width[1]. By this means a significant negative impact to the neighbor as a result of the introductions of GMOs to the neighboring harvest batches and thus a requirement to label the products as genetically modified can be avoided.

In the case of larger conventional cornfields – following consultation between the neighbors – GMO corn can even be cultivated directly adjacent without the separating strip, without the labeling threshold value of the affected harvest bath being exceeded.

[1] These recommendations refer only to the cultivation of corn silage. The analysis of the results for corn grain has not yet been completed.

Transparency

In the past several years, over 100 fields with genetically modified plants have been destroyed in Germany, most recently in Saxony-Anhalt, Baden-Wuerttemberg and Brandenburg. Included here were many areas belonging to state-run research institutions or, respectively, institutes with state-funded corollary scientific programs.

In order to not jeopardize the scientific assessment of the test crop and to protect the farmers and their families, the parties responsible for the project decided, after having consulted with all participating parties, to neither disclose the exact location of the cultivation fields nor the names of the respective farmers. This was done observing the permit conditions, which did not prescribe that the respective cultivation locations be disclosed.

Nonetheless, the participating farmers placed themselves under the obligation to inform their neighbors of the test crop in the event that their cultivation fields with conventional corn were located at a distance of less than 200 m to the area planted with Bt corn.

The participating government-owned operations in Bavaria and Saxony-Anhalt disclosed their locations and held public events. In addition InnoPlanta e.V. established a service telephone using which farmers cultivating corn this year could inform themselves of the test crop. If they provided the exact location of their cornfields, the farmers received information concerning whether Bt corn cultivation areas were in their direct vicinity.

The toll-free service telephone was put out of service at the end of August. At that time 65 concrete location inquiries had been received.

In addition, interested parties could inform themselves via the internet web page www.erprobungsanbau.de concerning the bases and objectives of the test crop.

Legal Framework

All of the corn used possess valid permits from the Federal Competent Authorities:

- an *Inverkehrbringungsgenehmigung* (permit allowing the product to be deliberately released into the environment) according to EU Directive 90/220/EWG (replaced today by Directive 2001/18/EG), which allows unrestricted, commercial cultivation
- a food authorization according to the EU Regulation 258/97 (“Novel Foods Regulation”, replaced today by EU Regulation 1829/2003), which allows an unrestricted use of the plants for the production of food – according to the new EU Regulation 1830/ 2003 this is subject to a requirement to provide labeling of the content of GMOs
- a distribution permit in accordance with the *Saatgutverkehrsgesetz* (German Seed Market Law) – for 2004 the *Bundessortenamt* (Federal Variety Registration Authority), which is under the jurisdiction of the *Bundesministerium für Verbraucherschutz, Ernaehrung und Landwirtschaft* (Federal Ministry for Consumer Protection, Food and Agriculture) allowed the planting of seven different Bt corn hybrids in quantities of a total of 30.5 tons.

Additionally the provisions set out in the *Deutsches Gentechnikgesetz* (German Law of Genetic Engineering) as well as those in the *Bürgerliches Gesetzbuch* (BGB, German Civil Code) apply.

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