Appendix 1. Post Market Monitoring of insect protected *Bt* maize MON 810 in Europe – Conclusions of a survey with Farmer Questionnaires in 2012

BioMath

APPLIED STATISTICS AND INFORMATICS
IN LIFE SCIENCES

Post Market Monitoring of insect protected *Bt* maize MON 810[1] in Europe

Biometrical annual Report 2012

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[1] The commercial name for MON 810 being YieldGard®corn borer maize. YieldGard®corn borer is a registered trademark of Monsanto Technology LLC.

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Summary

Monitoring of a genetically modified organism (GMO) that has been placed on the market is regulated in Annex VII of Directive 2001/18/EC [23]. Monitoring is supposed to confirm that any assumption regarding the occurrence and impact of potential adverse effects of the GMO or its use in the environmental risk assessment (ERA) is correct and to identify any adverse effect of the GMO and its use on human health or the environment which were not anticipated in the ERA. Monsanto has implemented monitoring of *Bt* maize containing event MON 810 through different tools, the main one being a farm questionnaire since 2006.

This biometrical report presents the outcomes of the statistical analysis of the farm questionnaires collected throughout European MON 810 cultivating countries in 2012. The questionnaires have been completed between December 2012 and March 2013. In the 2012 growing season 249 farm questionnaires have been surveyed.

2012 data indicates that in comparison to conventional maize plants, MON 810 plants

- received less insecticides caused by their inherent protection against certain lepidopteran pests,
- had less incidence of stalk/root lodging caused by the inherent protection against certain lepidopteran pests,
- had a longer time to maturity caused by the absence of pest pressure of certain lepidopteran pests,
- gave a higher yield caused by the better fitness of the plant,
- were less susceptible to diseases caused by hardly any insect feeding damage,
- controlled corn borers very well caused by the inherent protection against certain lepidopteran pests, and
- were less susceptible to pests, other than corn borers, especially lepidopteran pests caused by the inherent protection against certain lepidopteran pests and the resulting better fitness of the plants.

Moreover the animals fed with MON 810 performed slightly different compared to those fed with conventional maize. MON 810 fed animals were healthier resulting from a lower incidence of mycotoxins in the feed (due to lower ECB feeding damage on the plant).

The identified deviations have been expected, due to the knowledge of the MON 810 characteristics. The observed significant effects are not adverse. They mostly relate to the increased fitness of

MON 810 plants resulting from the inherent protection against certain lepidopteran pests. Overall, the monitoring results substantiate the results from scientific research.

In this year of data collection no adverse effects have been identified by MON 810 cultivating farmers.

Chapter 1

Introduction

According to Annex VII of Directive 2001/18/EC [23] of the European Parliament and of the Council on the deliberate release into the environment of genetically modified (GM) plants, the objective of the monitoring is to:

- confirm that any assumption regarding the occurrence and impact of potential adverse effects of the GMO or its use in the environmental risk assessment is correct, and
- identify the occurrence of adverse effects of the GMO or its use on human or animal health, or the environment, which were not anticipated in the environmental risk assessment.

Upon approval of MON 810 (Commission Decision 98/294/EC [22]), Monsanto has established a management strategy in order to minimize the development of insect resistance and offered to inform the Commission and/or the Competent Authorities of the results. These results on insect resistance monitoring, however, are not part of the current report.

The risk assessment for MON 810 showed that the placing on the market of MON 810 poses negligible risk to the environment. Any potential adverse effects of MON 810 on human health and the environment, which were not anticipated in the risk assessment, can be addressed under General Surveillance (GS). An important element of the GS, applied by Monsanto on a voluntary basis, is a farm questionnaire.

The objective of this biometrical report is to present the rationale behind the questionnaire approach and the analysis of the farm questionnaires used with farmers during the 2012 planting season. The questionnaire approach was applied for the first time in 2006. The format of the questionnaire is reviewed on a yearly basis based on the outcome of the latest survey.

Chapter 2

Methodology

2.1 Tool for general surveillance: the farm questionnaire

Structure of the farm questionnaire

Based on commonly defined protection goals, such as soil function, plant health, sustainable agriculture, etc. and derived areas of potential impact on these protection goals, a range of relevant monitoring characters for MON 810 GS has been identified (Table 2.1). These monitoring characters might be influenced by the cultivation of MON 810, but in an agricultural landscape other influencing factors (Table 2.3) exist which need to be taken into account as well, and therefore were also monitored.

For that purpose a farm questionnaire was designed to obtain data on monitoring characters and influencing factors. Any unusual observations observed in monitoring characters would lead to a consideration of the information gathered to determine whether the effect is attributable to changes in influencing factors or the genetic modification (see Appendix B). Farmers record a range of agronomic information, and are the most frequent and consistent observers of crops and fields. For example, they collect field-specific records of seeds, tilling methods, physical and chemical soil analysis, fertilizer application, crop protection measures, yields and quality. Additionally, farmers hold in their "farm files" historical records of their agricultural land and its management. These provide background knowledge and experience that can be used as a baseline for assessing deviations from what is normal for their cultivation areas.

The experimental questionnaire was developed by the German Federal Biological Research Center for Agriculture and Forestry (BBA, now JKI), maize breeders and statisticians in Germany (Wilhelm et al., 2004 [48]). Its questions were simplified to be easily understood by farmers and not to be too burdensome. Also, it had to be sufficiently pragmatic to take into account real commercial situations.

The questionnaire approach was tested in a pilot survey in 2005. Based on that year's experience an adapted version of the questionnaire was created and applied for the first time in 2006. The format of the questionnaire is reviewed on a yearly basis based on the outcome of the latest survey.

As appropriate, adjustments are made to improve the statistical relevance of the collected data. In 2009, the questionnaire was also adapted according to DG Environment feedback (13 March 2009) and discussions within EuropaBio (see Appendix B).

The questionnaire is organized around collecting data in four specific areas:

Part 1: Maize grown area

Part 2: Typical agronomic practices to grow maize on the farm

Part 3: Observations of MON 810

Part 4: Implementation of *Bt* maize specific measures

Part 1 records general, basic data on maize cultivation, cultivation area and local pest and disease pressure (independent from GM or non-GM cultivation - background and possible influencing factors). The objectives of **Part 2** are to establish what the normal practices of conventional cultivation are. It therefore establishes a baseline to which information generated in *Bt* areas can be compared. **Part 3** collects data on MON 810 practices and observations.

The aim of the survey is to identify potential adverse effects that might be related to MON 810 plants and their cultivation. For that reason, most questions are formulated to get ordinary data, i.e. with three possible answers ($Plus$/ $As\ usual$/ $Minus$). The $Plus$- and $Minus$-answers indicate a deviation from the situation with conventional maize and are provided with a specification to describe the specific effect and its potential cause. High frequency (> 10 %) of $Plus$ or $Minus$-answers would indicate possible effects (see Section 2.4).

In addition, Monsanto used this questionnaire to check if farmers are in compliance with the MON 810 cultivation recommendations. For that purpose, the answers and free remarks in **Part 4** were evaluated.

Coding of personal data

For confidentiality reasons and for identification, each questionnaire was assigned a unique code where personal data were coded according to the following format:

2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

year	event code	partner code	country code	interviewer code	farmer code	area code

Codes:

Event:	01	MON 810
	02	...

Partner:	MON	Monsanto
	MAR	Markin
	AGR	Agro.Ges
	...	...
Country:	ES	Spain
	PT	Portugal
	RO	Romania
	...	...
Interviewer:	01	A
	02	B
	03	...
Farmer:	incremental counter within the interviewer	
Area:	incremental counter within the farmer	

(e.g. 2012-01-MAR-ES-01-01-01). The data were stored and handled in accordance with the Data Protection Directive 95/46/EC [21]. This is in order to ensure an honest response and to avoid competitive intelligence.

Training of the interviewers

To assist the interviewers in filling the questionnaires with the farmers, a 'user´s manual' was developed. While questions have been carefully phrased to obtain accurate observations from farmers, previous experience with the questionnaire may increase awareness and thus result in slightly inconsistent observations from one year to the next.
Additionally, like in previous years, all interviewers have been trained to understand the background of the questions. Here also experience gained during previous years surveys (uncertainties, misinterpretation of questions) could be shared.

2.2 Definition of monitoring characters

The main focus of the questionnaire was the survey of several monitoring characters that were derived from protection goals like soil function, plant health and sustainable agriculture. Table 2.1 provides an overview on the monitored characters and the protection goals that are addressed by them.

Table 2.1: Monitoring characters and corresponding protection goals

Monitoring characters	**Protection goals**
Time of planting	Sustainable agriculture
Tillage and planting technique	Sustainable agriculture
Insect control practices	Sustainable agriculture
Weed control practices	Sustainable agriculture
Fungal control practices	Sustainable agriculture
Fertilizers application	Sustainable agriculture, soil function
Irrigation practice	Sustainable agriculture
Time of harvest	Sustainable agriculture, plant health
Germination vigor	Plant health
Time to emergence	Plant health
Time to male flowering	Plant health
Plant growth and development	Plant health, soil function
Incidence of stalk/ root lodging	Plant health
Time to maturity	Sustainable agriculture, plant health
Yield	Plant health, soil function
Occurrence of MON 810 volunteers	Sustainable agriculture
Disease susceptibility	Sustainable agriculture, plant health, biodiversity
Insect pest control (Ostrinia nubilalis, Sesamia spp.)	Plant health, sustainable agriculture
Pest susceptibility	Sustainable agriculture, plant health, biodiversity
Weed pressure	Sustainable agriculture, soil function, biodiversity
Occurrence of wildlife (insects, birds, mammals)	Sustainable agriculture, plant health, biodiversity
Performance of fed animals	Animal health
Additional observations	All

Note: only the main corresponding protection goals are listed. However, each of the monitoring characters is addressing most of the protection goals, e.g.: all the characters that concur to demonstrate the agronomic equivalence of MON 810 to conventional maize are addressing impact on biodiversity.

The data for the monitoring characters were surveyed on a qualitative scale by asking farmers for their assessment of the situation compared to conventional cultivation. The farmer is asked to specify the conventional variety(ies) he is cultivating on his farm and using as comparator(s). The farmers additionally use their general experience of cultivating conventional maize and especially assessing the seasonal specifics. Farmers normally know if any observed differences are based on i.e. different FAO of the different varieties. For most questions, three possible categories of answers were given: *As usual*, *Plus* (e.g. later, higher, more) or *Minus* (e.g. earlier, lower or less) (see Table 2.2).

Table 2.2: Monitoring characters and their categories

Monitoring characters - observations of MON 810	*Minus*	*As usual*	*Plus*
Time of planting	Earlier	As usual	Later
Tillage and planting technique	-	As usual	Changed
Insect control practices	-	As usual	Changed
Weed control practices	-	As usual	Changed
Fungal control practices	-	As usual	Changed
Fertilizer application	-	As usual	Changed
Irrigation practice	-	As usual	Changed
Time of harvest	Earlier	As usual	Later
Germination vigor	Less	As usual	More
Time to emergence	Accelerated	As usual	Delayed
Time to male flowering	Accelerated	As usual	Delayed
Plant growth and development	Accelerated	As usual	Delayed
Incidence of stalk/root lodging	Less	As usual	More
Time to maturity	Accelerated	As usual	Delayed
Yield	Lower	As usual	Higher
Occurrence of MON 810 volunteers	Less	As usual	More
Disease susceptibility	Less	As usual	More
Insect pest control (Ostrinia nubilalis)	Weak	Good	Very good
Insect pest control (Sesamia spp.)	Weak	Good	Very good
Pest susceptibility	Less	As usual	More
Weed pressure	Less	As usual	More
Occurrence of insects	Less	As usual	More
Occurrence of birds	Less	As usual	More
Occurrence of mammals	Less	As usual	More
Performance of fed animals	-	As usual	Different

2.3 Definition of influencing factors

Additionally, several possible influencing factors were surveyed to assess the local conditions and to determine the cause of potential effects in the monitoring characters (Table 2.3).

Table 2.3: Monitored influencing factors

Type	Factor
Site	Soil characteristics
	Soil quality
	Humus content
Cultivation	Crop rotation
	Soil tillage
	Planting technique
	Weed and pest control practices
	Application of fertilizer
	Irrigation
	Time of sowing
	Time of harvest
Environment	Local pest pressure
	Local disease pressure
	Local occurrence of weeds

2.4 Definition of baselines, effects and statistical test procedure

Normally - if there is no effect of MON 810 cultivation or other influencing factors, and the question being well formulated and unambiguous - one would expect a balanced distribution of the frequencies for the three categories with a predominant part of the farmers assessing the situation to be $As\ usual$ for a certain monitoring character. Small frequencies of differing answers result for example from uncertainty or environmental impacts and are expected to be balanced in both $Minus$ and $Plus$ direction and to run up to approximately 5% (Figure 2.1). Therefore, the ***baseline*** for the analysis of monitoring characters with categories $Minus$, $As\ usual$ and $Plus$ is set by a probability pattern 5% - 90% - 5%.

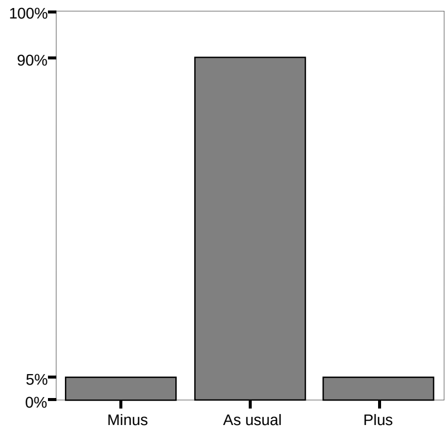

Figure 2.1: Balanced (expected) baseline distribution of the farmers´ answers (no effect)

An effect of the cultivation of MON 810 or any other influencing factor would arise in a greater percentage of $Plus$ or $Minus$ answers, where "greater" or an ***effect***, was quantitatively defined by exceeding a threshold of 10% (Figure 2.2 a and b). Graphically, an effect would be expressed by an unbalanced distribution (Figure 2.3 a and b).

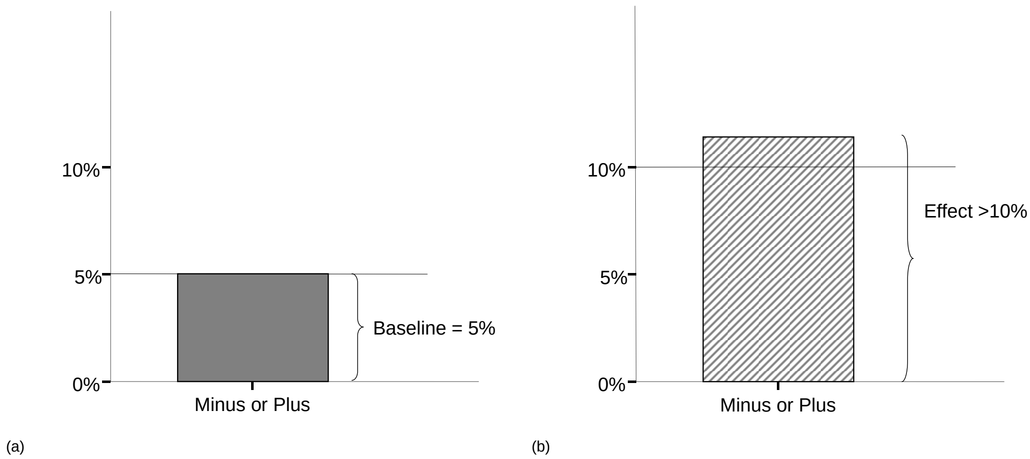

Figure 2.2: Definition of (a) baseline and (b) effect

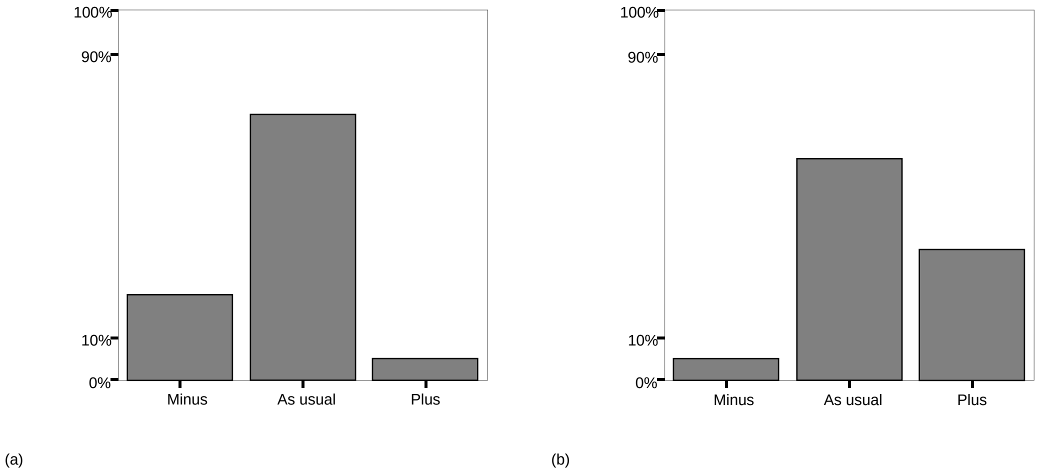

Figure 2.3: Examples for distributions of farmers' answers indicating an effect
(a) $> 10\%$ in category $Minus \rightarrow$ effect, (b) $> 10\%$ in category $Plus \rightarrow$ effect

Therefore, to identify an effect within the data means to test the frequencies of the $Plus$ or $Minus$ answers statistically against the threshold of 10%. The questions on monitoring characters in most cases propose three possible answers. To define TWO categories indicating a difference from $As\ usual$ instead of only ONE category $Different$ is necessary to distinguish between adverse and beneficial effects (the frequency of $Different$ answers would mix up both categories and not help for a risk assessment). A $Plus$ category not necessarily indicates a beneficial effect, a $Minus$ answer not neccessarily indicates an adverse effect. But both SINGLE categories indicate an effect itself. Both of these $Different$ frequencies are assessed instead of a three-category pattern for adverse effect identification. For holistic illustration the three-category-pattern is pictured. For both directions two independent null hypotheses are formed:

$$H_{0_1} : f_{minus} \geq 0.1 = f_{0_1} \qquad H_{0_2} : f_{plus} \geq 0.1 = f_{0_2}$$
$$H_{A_1} : f_{minus} < 0.1 \qquad H_{A_2} : f_{plus} < 0.1$$

and statistically tested by using the exact binomial test.

Consequently the analysis of each monitoring character is to be performed according to the following scheme:

1. The frequencies of the farmers answers for the three categories are calculated. The calculation of frequencies and their percentages is done both on the basis of all and on the basis of valid answers. When farmers gave no statement, these answers are accounted as missing values and therefore not considered valid. As a consequence, the "valid percentages" state the proportions of the several categories of an answer that are really known, whereas the "percentages" only specify the proportions of the categories within the whole answer spectrum, including no answers. Additionally, the accumulated valid percentages are calculated for illustrating the distribution function and for quality control reasons.

2. The frequencies of $Plus$ and/or $Minus$ answers are statistically tested against the threshold of 10%. The resulting P values are compared to a level of significance $\alpha = 0.01$. If P is less than $\alpha = 0.01$, the null hypothesis ($f_{minus} \geq 10\%$ or $f_{plus} \geq 10\%$) is rejected and thus no effect can be identified. In case of a P value greater than 0.01, the null hypothesis can not be rejected and an effect is indicated. In cases where the estimated frequencies are less than 10% but the corresponding P values greater than $\alpha = 0.01$ (and therefore those frequencies are not significantly less than 10%) the 99% confidence intervals for the frequencies are also calculated to better assess the severity of such test decisions.
3. Where an effect is indicated, the effect must be interpreted (adverse/ beneficial).
4. Where an adverse effect was identified, the cause of the effect was ascertained (MON 810 cultivation, other influencing factors).
5. Identification of adverse effects potentially caused by MON 810 cultivation, would require further examinations. (Such cases, however, have not been found in the 2012 data.)

2.5 Sample size determination and selection

The sample size determination of the survey was based on the statistical tests described above. It depends on the threshold for the test, the error of the first kind α, the error of the second kind β and the effect size d (Rasch et al., 2007 [27]).

The error of the first kind is the probability to reject the null hypothesis although it is true, i.e. to not identifying an existing effect. This probability should be as small as possible since it is the aim of General Surveillance to identify any adverse effects. The error of the first kind is also called consumer´s risk. The error of the second kind is the probability to accept the null hypothesis although it is false, i.e. identifying an effect although no one exists. This probability also should be as small as possible since this means to raise false alarm. The error of the second kind is also called producer´s risk (Table 2.4).

Table 2.4: Error of the first kind α and error of the second kind β for the test decision in testing frequencies of $Plus$ or $Minus$ answers from farm questionnaires against the threshold of 10%

		Real situation	
		$f \geq 10\%$ **indication for an effect**	$f < 10\%$ **no effect**
Test decision	**Acceptance** $H_0 : f \geq 10\%$	Right decision with Probability $1 - \alpha = 99\%$	Wrong decision with Probability $\beta = 1\%$
	Rejection $H_0 : f \geq 10\%$	Wrong decision with Probability $\alpha = 1\%$	Right decision with Probability $1 - \beta = 99\%$ $= POWER$

The magnitude of the effect size d was chosen from experience in analyzing farm questionnaires in a pilot study in Germany 2001 - 2005 [34].

For determination of the sample size CADEMO light [7] was used as proposed by Rasch et al., 2007 [27] for a binomial test (Method 3/62/1005). Within this survey the accuracy demands $p = 0.1$ (threshold for adverse effects to be tested: 10% of $Minus$ (or $Plus$) answers), $\alpha = 0.01$ (error of the first kind), $\beta = 0.01$ (error of the second kind), and $d = 3\%$ (effect size) should be met. Under this demands for a one sample problem, testing a probability against a threshold with a one-sided test, a sample size of 2436 questionnaires was calculated. To get this sample size, even if the response rate is low or questionnaires have to be excluded from the survey because of low quality, this number was rounded to 2500 questionnaires.

Since the monitoring objects are the fields where genetically modified crops are cultivated, all fields within the EU being cultivated within the 10-years authorisation period represent the total population from which the maximal 2500 fields have to be selected for GS survey. Sampling of these 2500 fields should ensure to reflect the range and distribution of plant production systems and environments exposed to the GM plant and its cultivation. This range, on the one hand, is characterised by the growing season (year and its climatic, environmental conditions). On the other hand, it is characterised by the regions where GM cultivation takes place. Regions may be various production systems, regulatory requirements, agro-political and socio-economic conditions and can therefore be best described by European countries. Sampling therefore takes place within strata (defined by years and countries of cultivation).

The total number of 2500 monitoring objects is firstly subdivided equally into 250 objects per year. Subdividing the number per year into the cultivation regions considers fluctuant adoption of the GM plant (grade of market maturity) and therefore is performed yearly for the actual situation. In the moment, only the total cultivated area (in ha) is known instead of the total number of growers (and of fields and field sizes). That implies that the sampling frame for this survey can not be based on the whole of fields with MON 810 cultivation in Europe. Therefore a quota considering the area of cultivation (ratio of country and total area) will be the first subdivision factor. Additionally, the product situation (and therefore the field sizes) within the countries serves for the second subdivision factor. Both subdivision factors result in the number of farmers to be monitored per year and country.

If fewer than 250 fields per year are cultivated, the maximum possible number of monitoring objects is surveyed.

The selection of farmers for the survey within the countries follows European practical conditions. The total number of farmers cultivating MON 810 per country is not known, farmers are selected from public registers (Portugal, Romania) or customer lists of the seed selling companies (Czech Republic, Slovakia). The public registers do not necessarily contain the contact data of the farms so it is often very difficult to identify them. The customer lists of the seed selling companies do not completely cover all MON 810 cultivating farmers, so that some are missing. For example, in Spain there are no lists at all. Here, the interviewers identify MON 810 cultivating farmers by knowledge from previous surveys or search in the region. When buying the seed, farmers are informed to possibly be contacted for GS survey. In general, only a few farmers refuse to participate, but when a farmer refuses, it is recorded. The final number of farmers per country, that will be included in the biometrical analysis, will depend on their availability and willingness.

Consequently, cultivation areas with a high uptake of the GM plant will be over-represented by a high number of fields to be monitored. Within each stratum (per year and country) the determined number of monitoring units is selected randomly where each field has the same chance to be surveyed. The whole sampling procedure ensures that the monitoring area will be proportional to and representative of the total regional area under GM cultivation.

The surveys are performed after the planting season, the farmers are provided with a copy of the questionnaire at least two weeks before a telephone interview or interviewed face-to-face.

2.6 Power of the Test

The power of the test $f_{minus} \geq 0.1 = f_{0_1}$ or $f_{plus} \geq 0.1 = f_{0_2}$ is the probability to detect a frequency of $Plus$ or $Minus$ answers not greater than 0.1, where no effect exists. It is defined as $1 - \beta$ ($\beta =$ error of the second kind) and is calculated as followed:

$$Power = \sum_{F=0}^{F_U - 1} \left(\frac{n!}{F!\,(n-F)!} \right) f^F \,(1-f)^{n-F}$$

while:

$$F_U = \min_F \left(P \left(F \leq F_E | H_0 \right) > \alpha \right)$$

$f =$ given frequency of $Plus$ or $Minus$ answers for which the power is calculated

$F_E =$ absolute frequency of $Plus$ or $Minus$ answers

Given a frequency of 5% of $Plus$ or $Minus$ answers (within the baseline, no effect!), a sample size of $n = 250$ and a probability value $\alpha = 0.01$, no effect will be detected with a power of 73% ($\beta = 0.27$) (Figure 2.4). The power increases for frequency values smaller than 5% and decreases for frequency values greater than 5%.
For a frequency of 10% the power is close to 0, i.e. in case we have an effect the null hypothesis $H_0 : f_{different} \geq 0.1$ will not be rejected and an effect will be recognized for sure. In conclusion, the power of the test as it is currently designed, i.e. to detect no effect where no effect exists during a one year analysis based on 250 questionnaires, is high, but will be increased with the growing sample size over the years, to reduce the producer´s risk (error of the second kind β).

2.7 Data management and quality control

A database was developed for data management and storage. For each question a variable was defined by a variable name (eight-digit in maximum) and a variable label (short description of the question). The variables were specified according to their type (qualitative or quantitative), format etc. Missing values were defined (-1: no statement, -2: not readable). For not readable entries in the questionnaires, queries were formulated and the field representatives or farmers were asked for clarification. These entries in the database were corrected. For quantitative variables (e.g. total

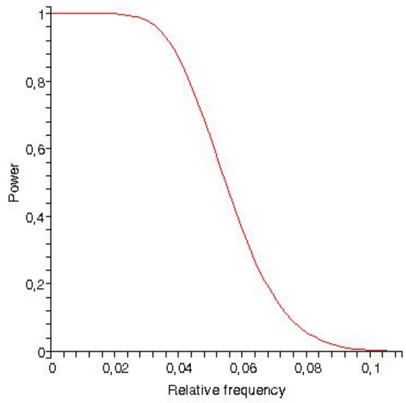

Figure 2.4: Function of the power of the test with a sample size number of 250 and a probability value of $\alpha = 0.01$

maize area in ha) the real values from the questionnaire were taken for the database, for qualitative variables the possible parameter values (e.g. $Plus/As\ usual/Minus$) were defined and coded (and only the coded values taken).

High quality of the data is assured by training the interviewers initially in a workshop and for refreshment yearly by phone. In face-to-face interviews, the interviewers are instructed to check whether the farmer‘s answer corresponds to their documentation. When surveys are performed by phone, the farmers get the questionnaire about two weeks in advance to pick up the information from their documentation.

All data are entered and controlled for their quality and plausibility.

A quality control check first checks the completeness of the data. Some data fields (especially the monitoring characters or comments in case of farmer‘s assessments differ from $As\ usual$) are defined to be obligatory, therefore missing values or unreadable entries are not accepted. Furthermore the values are checked for correctness (quantitative values within a plausible min-max range, qualitative values meeting only acceptable parameter values). Plausibility control checks the variable values for their contents, both to find incorrect answers and to prove the logical connections between different questions. It also looks for the consistency between $Plus/Minus$-answers and specifications, i.e. whether all these answers were provided with a specification and whether the specifications really substantiated the $Plus/Minus$-answers.

For any missing or implausible data the interviewers are asked to contact the farmers again to complete or correct the questionnaire (interviewers get written queries from BioMath).

Chapter 3

Results

The questionnaires have been completed between December 2012 and March 2013. In the 2012 growing season 249 farm questionnaires have been collected. Quality and plausibility control confirmed that all 249 questionnaires could be considered for analysis. This good quality also resulted from the interviewer training.

The analysis shows that in most cases, the frequencies for the three categories of the monitoring characters show the expected balanced distribution. In some cases, deviations are identified.

An overview of numbers, percentages and levels of significance of the binomial tests of the data in 2012 is given in Table 3.1. The fields highlighted in grey mark the cases for which the test against the 10% threshold resulted in P values greater than 0.01, so the null hypotheses, that these values are greater than 10% could not be rejected, and therefore indicate the occurrence of an effect. Taken together, 2012 data indicates that in comparison to conventional maize plants, MON 810 plants

- received less insecticides,
- had less incidence of stalk/root lodging,
- had a longer time to maturity,
- gave a higher yield,
- were less susceptible to diseases,
- controlled corn borers very well, and
- were less susceptible to pests other than corn borers, especially lepidopteran pests.

Moreover the animals fed with MON 810 performed slightly different compared to those fed with conventional maize.

In the following sections the detailed analysis of all parameters surveyed using the questionnaire in 2012 is described and the results are assessed scientifically.

Table 3.1: Overview on the results of the descriptive analysis of the monitoring characters in 2012

Monitoring characters[1]	N valid	*Minus*[1]	P for $p_0 = 0.1$	*As usual*[1]	*Plus*[1]	P for $p_0 = 0.1$
Crop rotation	249			238 (95.6%)	11 (4.4%)	< 0.01
Time of planting	249	0 (0.0%)	< 0.01	240 (96.4%)	9 (3.6%)	< 0.01
Tillage and planting technique	249			244 (98.0%)	5 (2.0%)	< 0.01
Insect control practices	249			206 (82.7%)	43 (17.3%)	1.0
Weed control practices	249			249 (100.0%)	0 (0.0%)	< 0.01
Fungal control practices	249			249 (100.0%)	0 (0.0%)	< 0.01
Maize Borer control practice	249			204 (81.9%)	45 (18.1%)	1.0
Fertilizer Application	249			249 (100.0%)	0 (0.0%)	< 0.01
Irrigation Practices	249			249 (100.0%)	0 (0.0%)	< 0.01
Time of harvest	249	0 (0.0%)	< 0.01	239 (96.0%)	10 (4.0%)	< 0.01
Germination vigor	249	1 (0.4%)	< 0.01	234 (94.0%)	14 (5.6%)	< 0.01
Time to emergence	249	2 (0.8%)	< 0.01	246 (98.8%)	1 (0.4%)	< 0.01
Time to male flowering	249	2 (0.8%)	< 0.01	244 (98.0%)	3 (1.2%)	< 0.01
Plant growth and development	249	4 (1.6%)	< 0.01	240 (96.4%)	5 (2.0%)	< 0.01
Incidence of stalk / root lodging	249	70 (28.1%)	1.0	179 (71.9%)	0 (0.0%)	< 0.01
Time to maturity	249	0 (0.0%)	< 0.01	209 (83.9%)	40 (16.1%)	0.999
Yield	249	6 (2.4%)	< 0.01	136 (54.6%)	107 (43.0%)	1.0
Occurrence of volunteers	237	10 (4.2%)	< 0.01	227 (95.8%)	0 (0.0%)	< 0.01
Disease susceptibility	249	43 (17.3%)	0.999	206 (82.7%)	0 (0.0%)	< 0.01
Insect pest control (*Ostrinia nubilalis*)	246	0 (0.0%)	< 0.01	22 (8.9%)	224 (91.1%)	1.0
Insect pest control (*Sesamia* spp.)	216	0 (0.0%)	< 0.01	20 (9.3%)	196 (90.7%)	1.0
Pest susceptibility	249	53 (21.3%)	1.0	195 (78.3%)	1 (0.4%)	< 0.01
Weed pressure	249	0 (0.0%)	< 0.01	249 (100.0%)	0 (0.0%)	< 0.01
Occurrence of insects	241	0 (0.0%)	< 0.01	241 (100.0%)	0 (0.0%)	< 0.01
Occurrence of birds	241	0 (0.0%)	< 0.01	241 (100.0%)	0 (0.0%)	< 0.01
Occurrence of mammals	243	1 (0.4%)	< 0.01	242 (99.6%)	0 (0.0%)	< 0.01
Performance of animals	29			26 (89.7%)	3 (10.3%)	0.671

For grey highlighted frequency values the test against the 10% threshold resulted in P values greater than 0.01, so the null hypotheses, that these values are greater than 10% could not be rejected.

[1] Monitoring characters and their categories are defined in section 2.2

3.1 Sampling and quality and plausibility control

The questionnaires have been completed between December 2012 and March 2013. In the 2012 growing season 249 farm questionnaires have been collected.

In Spain, the largest market, the surveys (175) were performed by Instituto Markin, SL [1], in Portugal 41 surveys were performed by Agro.Ges - Sociedade de Estudos e Projectos [2]. These companies have an established experience in agricultural surveys. In the Czech Republic and Slovakia the surveys (23) were performed by the Czech Agriculture University [3]. In Romania (10) Monsanto's field representatives assisted the farmers in filling in the questionnaires.

One farmer from the Czech Republic refused to participate in the survey, because he did not have time to fulfill a questionnaire. In all other countries all farmers responded to the questionnaire. This results in a response rate of 95.7% for Czech Republic and 100% for Spain, Portugal, Slovakia and Romania.

After the first quality and plausibility control, 27 farmers were contacted again to provide additional clarifications (10 from Romania, 6 from Spain, 6 from Portugal and 5 from Czech Republic). Examples of items that had to be clarified were incorrect variety names (MON 810 varieties as well as conventional varieties) and missed answers (surrounding environment, soil quality, weed and pest control practices in conventional maize as well as in MON 810, date of harvest, application of fertilizer and weed pressure in MON 810). Several farmers were also asked to clarify some inconsistencies between weed and pest control practices in conventional maize compared to MON 810, and plant protection products used in MON 810. Furthermore, discrepancies between named conventional varieties and planting of a refuge had to be resolved. After including the corrections, the quality and plausibility control confirmed that all 249 questionnaires could be considered for analysis.

The good quality of the questionnaires also resulted from the interviewer training.

The database currently contains 1848 cases (questionnaires) for 7 field seasons: 251 for 2006, 291 for 2007, 297 for 2008, 240 for 2009, 271 for 2010, 249 for 2011 and 249 for 2012.

3.2 Part 1: Maize grown area

3.2.1 Location

In 2012, 249 questionnaires were surveyed in the cultivation areas of MON 810 in 5 European countries. On average, 7.1% of the total planted MON 810 surfaces were monitored during the 2012 survey (Table 3.2).

Figure 3.1 shows a geographical overview on the main cultivation areas of MON 810 in Europe in 2012 (grey areas) and the location of the monitoring sites (numbers).

[1] Instituto Markin, SL; c/ Caleruega, 60 4º D -28033 Madrid -Spain
[2] Agro.Ges -Sociedade de Estudos e Projectos, Av. da República, 412, 2750-475 Cascais -Portugal
[3] Czech Agricultural University, Kamýcká 129, Praha 6 -Suchdol, 165 21 Czech Republic

Table 3.2: MON 810 cultivation and monitored areas in 2012

Country	Total planted MON 810 surfaces (ha)	Monitored MON 810 surfaces (ha)	Monitored MON 810 surfaces / total planted MON 810 surfaces (%)
Czech Republic	3052	2390	78.3
Portugal	9278	2521	27.2
Romania	217	216	99.5
Slovakia	189	169	89.4
Spain	116306	3822	3.3
Total	129042	9118	7.1

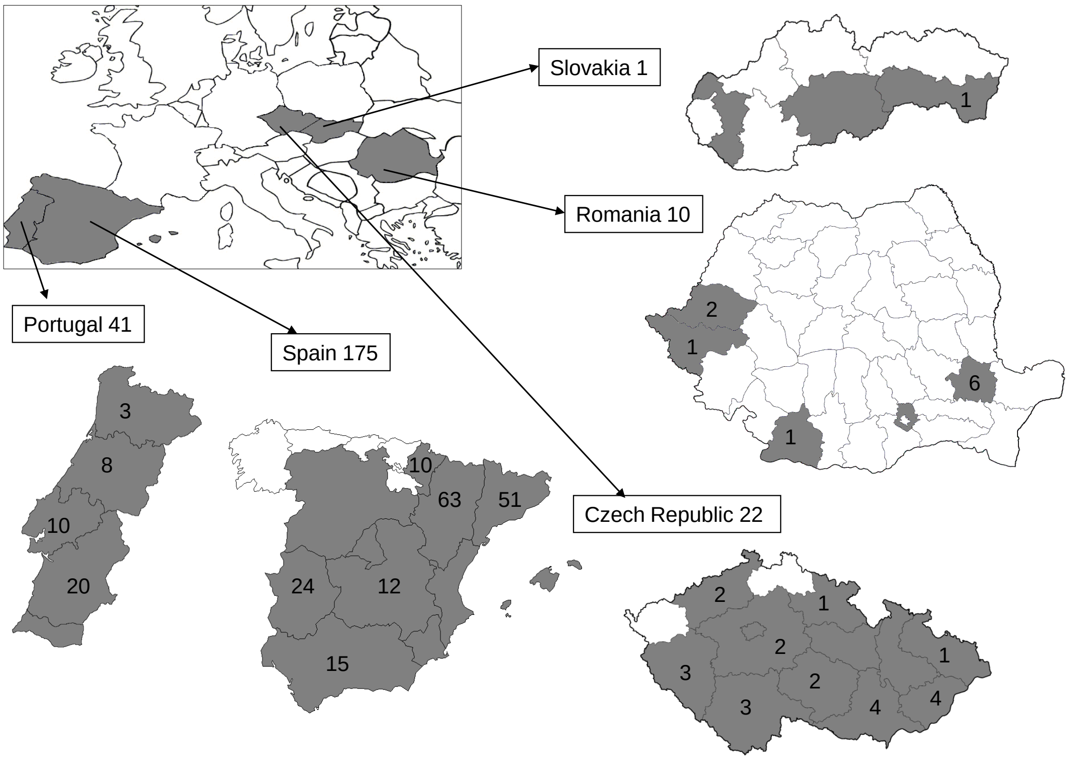

Figure 3.1: Number of sampling sites within the cultivation areas (grey) of MON 810 in Europe in 2012

3.2.2 Surrounding environment

The farmers were asked to describe the land usage in the surrounding of the areas planted with maize. Most of the fields (96.0%) are surrounded by farmland and only a few (2.0%) by forest and wild habitats (Table 3.3, Figure 3.2).

Table 3.3: Land usage in the surrounding of the areas planted with MON 810 in Europe in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	Farmland	239	96.0	96.0	96.0
	Forest or wild habitat	5	2.0	2.0	98.0
	Farmland and forest or wild habitat	3	1.2	1.2	99.2
	Farmland, forest or wild habitat, residential or industrial	2	0.8	0.8	100.0
Total		249	100.0	100.0	

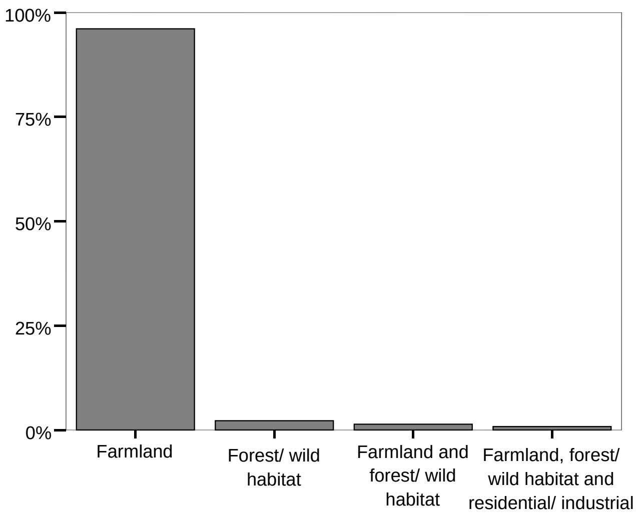

Figure 3.2: Land usage in the surrounding of the areas planted with MON 810 in Europe in 2012

3.2.3 Size and number of fields of the maize cultivated area

The size of the total maize area at the farms in 2012 ranged from 1.0 to 2000.0 hectares with an overall mean of 91.0 hectares. MON 810 was cultivated in 2012 on 36.6 hectares in average (minimum 0.03; maximum 278 hectares). Details for cultivation of maize in 2006 - 2012 by country can be found in Tables 3.5 and 3.6.

Figure 3.3 shows the mean percentage of MON 810 cultivation area within total maize area per farmer from 2006 to 2012.

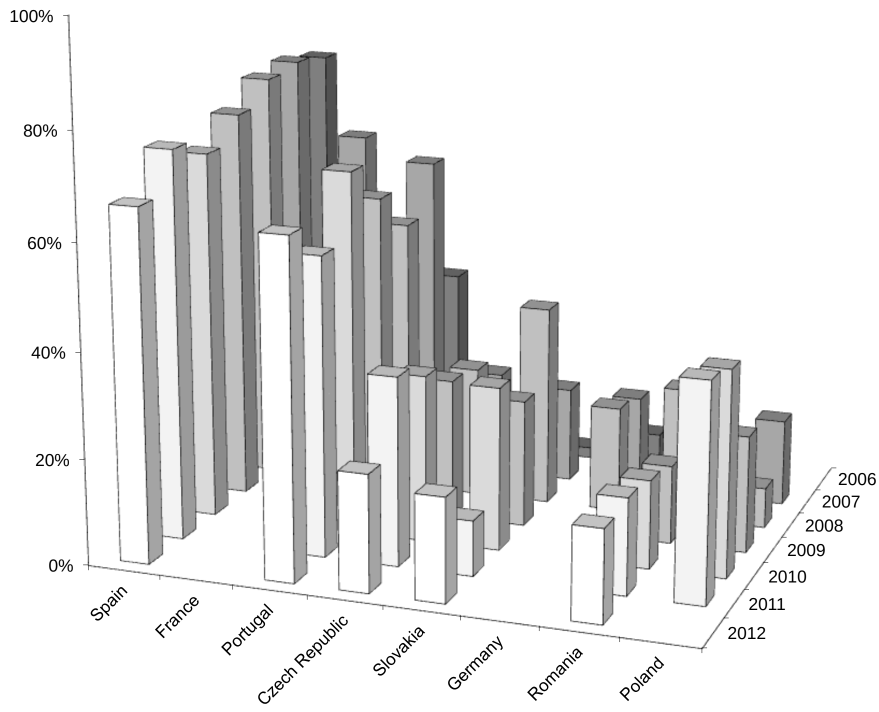

Figure 3.3: Mean percent of MON 810 cultivation area of total maize area per farmer in 2006 - 2012

In 2012 MON 810 was cultivated on one up to 30 fields per farm. In average every farmer cultivated MON 810 on nearly 4 fields (Table 3.4).

Table 3.4: Number of fields with MON 810 in 2012

Valid N	Mean	Minimum	Maximum	Sum
249	4.33	1	30	1079

Table 3.5: Maize area (ha) per surveyed farmer in 2006, 2007, 2008 and 2009

		2006			2007			2008			2009		
Country	Total Area (ha)	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Spain	all maize	26.9	1.0	204.0	31.6	1.0	210.0	31.6	1.5	294.0	28.3	3.0	260.0
	MON 810	21.0	1.0	170.0	25.2	1.0	200.0	24.9	0.5	266.0	21.1	2.0	200.0
France	all maize	80.4	9.6	500.0	54.6	6.0	500.0	-	-	-	-	-	-
	MON 810	18.3	0.4	104.0	35.8	2.0	150.0	-	-	-	-	-	-
Portugal	all maize	100.3	10.0	278.0	89.3	7.0	470.0	78.6	10.0	350.0	78.8	8.0	310.0
	MON 810	35.3	3.0	130.0	54.8	0.8	320.0	41.1	2.5	240.0	47.8	1.0	250.0
Czech Republic	all maize	424.6	52.0	2500.0	433.8	89.3	1400.0	431.9	57.4	3000.0	338.9	8.4	789.1
	MON 810	28.2	1.5	125.0	86.3	19.5	466.0	107.6	10.0	561.1	90.4	6.5	500.0
Slovakia	all maize	491.7	65.0	1300.0	277.2	20.0	659.4	340.2	124.0	637.3	546.7	270.0	895.0
	MON 810	10.0	10.0	10.0	50.6	10.0	174.6	130.1	10.0	400.0	132.3	50.0	285.0
Germany	all maize	274.8	39.0	1110.0	239.5	20.0	1130.0	256.1	4.8	1470.0	-	-	-
	MON 810	17.3	1.0	50.0	43.0	0.5	166.0	51.6	0.2	200.0	-	-	-
Romania	all maize	-	-	-	1969.8	253.0	5616.0	591.4	5.4	6789.0	417.5	2.5	6869.0
	MON 810	-	-	-	61.4	0.5	216.0	149.0	2.0	2705.0	62.1	1.0	1114.0
Poland	all maize	-	-	-	79.0	20.0	130.0	222.7	4.2	940.0	58.0	39.0	95.0
	MON 810	-	-	-	13.0	11.0	15.0	17.0	4.2	50.0	12.8	5.5	25.0

Table 3.6: Maize area (ha) per surveyed farmer in 2010, 2011 and 2012

		2010			2011			2012		
Country	Total Area (ha)	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Spain	all maize	34.2	2.0	300.0	33.6	2.0	300.0	33.0	1.0	320.0
	MON 810	23.9	1.0	240.0	24.7	2.0	220.0	21.8	1.0	278.0
France	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Portugal	all maize	78.4	9.0	377.0	95.9	10.0	377.0	96.7	10.0	300.0
	MON 810	53.9	1.5	264.0	54.2	2.0	264.0	61.5	1.5	240.0
Czech Republic	all maize	355.7	2.2	2000.0	409.9	45.0	900.0	492.2	8.4	2000.0
	MON 810	112.7	2.0	654.0	146.0	20.0	640.0	108.6	6.6	230.0
Slovakia	all maize	594.9	150.0	859.6	986.0	447.6	1700.0	862.9	862.9	862.9
	MON 810	184.2	60.0	400.7	103.0	48.1	140.8	169.0	169.0	169.0
Germany	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Romania	all maize	196.9	20.0	1100.0	180.3	65.0	700.0	124.0	20.0	500.0
	MON 810	32.9	0.1	284.0	32.8	2.5	99.0	21.6	0.034	59.3
Poland	all maize	61.1	19.0	150.0	61.8	10.0	180.0	-	-	-
	MON 810	23.8	1.5	100.0	25.3	1.0	130.0	-	-	-

3.2.4 Maize varieties grown

The farmers were asked to list up to five MON 810 varieties and up to five conventional maize varieties that they cultivated in 2012 on their farm. 59 different MON 810 varieties and 136 different conventional maize varieties were listed. The most named varieties (at least 6 times) and the frequencies are listed in Table 3.7.

Table 3.7: Names of most cultivated MON 810 and conventional maize varieties in 2012

MON 810 maize		Conventional maize	
Variety	Frequency	Variety	Frequency
PR 33 Y 72	87	PR 33 Y 74	34
PR 33 D 48	47	PR 32 T 16	28
DKC 6667 YG	31	DKC 6717	21
PR 33 P 67	26	DKC 6666	18
PR 33 W 86	22	PR 31 D 58	14
DKC 5590 YG	18	DKC 6450	13
DKC 6451 YG	17	P 1114	13
PR 35 A 56	17	Sancia	12
PR 34 A 27	16	DKC 4590	10
DKC 5277 YG	14	DKC 5276	10
BELES SUR	11	DKC 5542	10
Carella YG	11	DKC 3511	8
PR 32 G 49	11	DKC 6815	8
DKC 3512 YG	11	PR 33 W 82	8
PR 34 N 44	9	PR 33 A 46	7
Antiss YG	8	PR 33 P 66	7
DKC 2961 YG	7	PR 34 N 43	7
LG 3711 YG	7	DKC 5401	6
DKC 3946 YG	6	Ronaldinio	6
DKC 5784 YG	6		

3.2.5 Soil characteristics of the maize grown area

To assess the possible influence of the soil on monitoring characters data on soil characteristics, quality and carbon content were surveyed. Table 3.8 summarizes the reported soil types of the maize grown area.

Table 3.8: Predominant soil type of maize grown area in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	fine (clay, sandy clay, silty clay)	71	28.5	28.5	28.5
	medium (sandy clay loam, clay loam, sandy silt)	86	34.5	34.5	63.1
	medium-fine (silty clay loam, silt loam)	28	11.2	11.2	74.3
	coarse (sand, loamy sand, sandy loam)	25	10.0	10.0	84.3
	no predominant soil type (different soil types)	39	15.7	15.7	100.0
Total		249	100.0	100.0	

Farmers responses regarding the quality of the soil of the area grown with maize are given in Table 3.9 and Figure 3.4. 96.8% (241/249) of the maize was grown on normal or good soil according to the response of the farmers. The highest percentages of poor soil quality were found in Portugal (7.3%, 3/41).

Table 3.9: Soil quality of the maize grown area as assessed by the farmers in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	above average - good	36	14.5	14.5	14.5
	average - normal	205	82.3	82.3	96.8
	below average - poor	8	3.2	3.2	100.0
Total		249	100.0	100.0	

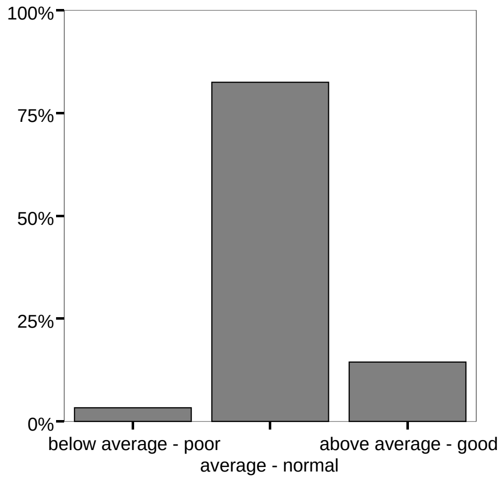

Figure 3.4: Soil quality of the maize grown area as assessed by the farmers in 2012

83 farmers were able to specify the humus content (not a commonly known measure all over Europe), which ranged from 0.6% to 5.9% with a mean of 1.8% (Table 3.10). 166 farmers did not specify the humus content: 100.0% (1/1) of the Slovak, 90.9% (20/22) of the Czech, 82.3% (144/175) of the Spanish, 10.0% (1/10) of the Romanian and 0.0% (0/41) of the Portuguese farmers.

Table 3.10: Humus content (%) in 2012

Valid N	Mean	Minimum	Maximum	Missing N
83	1.8	0.6	5.9	166

3.2.6 Local disease, pest and weed pressure in maize

Data of local disease, pest and weed pressure in maize are collected to find out if these environmental data have any influence on the values of the monitoring characters. These data differ from year to year and depend on the cultivation area and reflect the assessment of the farmer.

Local disease pressure as assessed by the farmers

The local disease pressure (fungal, viral) in maize was assessed to be low or as usual by 80.7% (201/249) of the farmers (Table 3.11, Figure 3.5). From the 61 farmers who assessed the pressure to be low, 47.5% (29/61) came from Spain and 36.1% (22/61) came from Portugal. 19.3% (48/249) stated the local disease pressure as high, where 84.4% (41/48) of them came from Spain and 8.3% (4/48) from Portugal.

Table 3.11: Farmers assessment of the local disease pressure (fungal, viral) in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	61	24.5	24.5	24.5
	as usual	140	56.2	56.2	80.7
	high	48	19.3	19.3	100.0
Total		249	100.0	100.0	

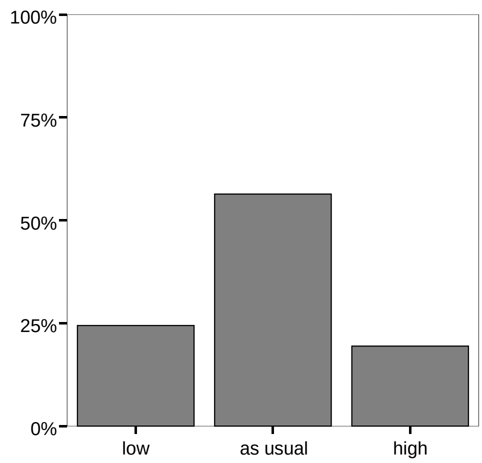

Figure 3.5: Farmers assessment of the local disease pressure (fungal, viral) in 2012

Local pest pressure as assessed by the farmers

Regarding the local pest pressure (insects, mites, nematodes), 79.5% (198/249) of the farmers evaluated it to be low or as usual and 20.5% (51/249) evaluated it to be high (Table 3.12, Figure 3.6). 60.9% (28/46) of the farmers assessing low pest pressure came from Spain, 92.2% (47/51) of the farmers with high pest pressure also came from Spain.

Table 3.12: Farmers assessment of the local pest pressure (insects, mites, nematodes) in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	46	18.5	18.5	18.5
	as usual	152	61.0	61.0	79.5
	high	51	20.5	20.5	100.0
Total		249	100.0	100.0	

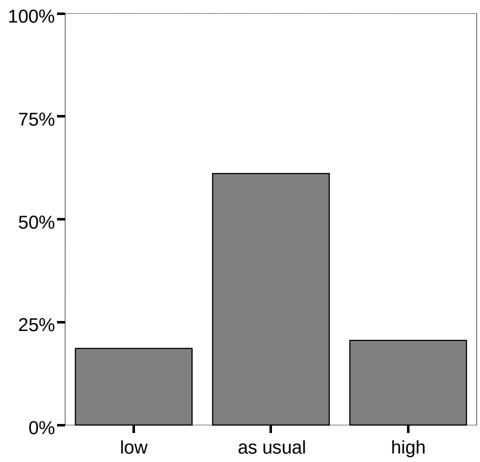

Figure 3.6: Farmers assessment of the local pest pressure (insects, mites, nematodes) in 2012

Local weed pressure as assessed by the farmers

88.8% (221/249) assessed the local weed pressure to be low or as usual and 11.2% (28/249) evaluated it to be high (Table 3.13, Figure 3.7). 82.1% (23/28) of the farmers with low weed pressure came from Spain. 46.4% (13/28) who evaluated it to be high also came from Spain.

Table 3.13: Farmers assessment of the local weed pressure in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	28	11.2	11.2	11.2
	as usual	193	77.5	77.5	88.8
	high	28	11.2	11.2	100.0
Total		249	100.0	100.0	

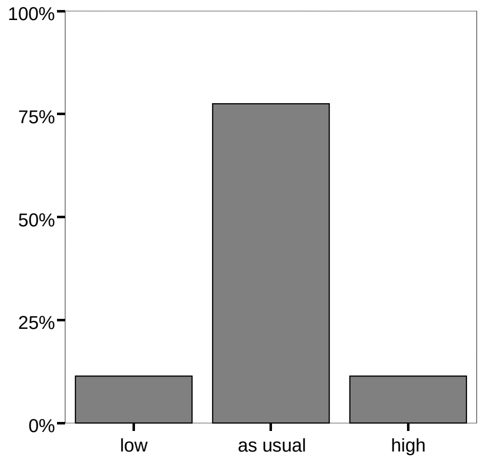

Figure 3.7: Farmers assessment of the local weed pressure in 2012

3.3 Part 2: Typical agronomic practices to grow maize

3.3.1 Irrigation of maize grown area

89.2% (222/249) irrigated their fields (Table 3.14): 100% (175/175) of the Spanish, 100% of the Portuguese (41/41) and 6.0% (6/10) of the Romanian farmers. In Czech Republic and Slovakia the farmers did not irrigate their maize grown area. The irrigation of the maize grown area is a productivity factor. These data reflect the general practices in Europe. The irrigation depends on the weather conditions, even though it could be relevant for the analysis of GM maize specific effects.

Table 3.14: Irrigation of maize grown area in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	222	89.2	89.2	89.2
	no	27	10.8	10.8	100.0
Total		249	100.0	100.0	

The most of the irrigating farmers used Gravity (49.1%) followed by Sprinkler (31.5%) and Pivot (14.4%). Some of them used more than one of the named or other types of irrigation (Table 3.15).

Table 3.15: Type of irrigation in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	Gravity	109	49.1	49.1	49.1
	Sprinkler	70	31.5	31.5	80.6
	Pivot	32	14.4	14.4	95.0
	other	6	2.7	2.7	97.7
	Sprinkler and Pivot	3	1.4	1.4	99.1
	Pivot and other	2	0.9	0.9	100.0
Total		222	100.0	100.0	

3.3.2 Major rotation of maize grown area

The main crop rotation within three years is maize-maize-maize followed by cereals-cereals-maize, maize-cereals-maize and cereals-maize-maize. Some other crop rotations were mentioned, but all with low occurrence (Table 3.16). The group of Legumes contains peas, beans, vetch (Vicia) and Lucerne (Alfalfa).

Table 3.16: Major rotation of maize grown area before 2012 planting season (two years ago and previous year) sorted by frequency

	Two years ago	Previous year	Frequency	Percent	Valid percentages	Accumulated percentages
Valid	maize	maize	108	43.4	43.4	43.4
	cereals	cereals	25	10.0	10.0	53.4
	maize	cereals	21	8.4	8.4	61.8
	cereals	maize	16	6.4	6.4	68.3
	legumes	maize	14	5.6	5.6	73.9
	maize	cotton	10	4.0	4.0	77.9
	legumes	legumes	9	3.6	3.6	81.5
	maize	vegetables	5	2.0	2.0	83.5
	cereals	legumes	5	2.0	2.0	85.5
	oil plants	cereals	5	2.0	2.0	87.6
	vegetables	vegetables	4	1.6	1.6	89.2
	maize	legumes	3	1.2	1.2	90.4
	oil plants	maize	3	1.2	1.2	91.6
	cotton	maize	3	1.2	1.2	92.8
	maize	oil plants	2	0.8	0.8	93.6
	cereals	oil plants	2	0.8	0.8	94.4
	legumes	cereals	2	0.8	0.8	95.2
	legumes	vegetables	2	0.8	0.8	96.0
	no cultivation	maize	2	0.8	0.8	96.8
	no cultivation	no cultivation	2	0.8	0.8	97.6
	cereals	vegetables	1	0.4	0.4	98.0
	oil plants	vegetables	1	0.4	0.4	98.4
	vegetables	maize	1	0.4	0.4	98.8
	vegetables	cereals	1	0.4	0.4	99.2
	vegetables	legumes	1	0.4	0.4	99.6
	vegetables	cotton	1	0.4	0.4	100.0
Total			249	100.0	100.0	

3.3.3 Soil tillage practices

The farmers were asked to answer whether they performed soil tillage. 97.6% (243/249) said "yes" (Table 3.17) while 2.4% (6/249) answered "no". Five farmers who answered "no" (83.3%) came from Spain, one (16.7%) from Czech Republic.

Table 3.17: Soil tillage practices in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	243	97.6	97.6	97.6
	no	6	2.4	2.4	100.0
Total		249	100.0	100.0	

All farmers who said "yes" specified the time of tillage. 68.7% (167/243) performed it in winter, 30.9% (75/243) in spring and 0.4% (1/243) in winter and spring (Table 3.18, Figure 3.8).

Table 3.18: Time of tillage in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	winter	167	68.7	68.7	68.7
	spring	75	30.9	30.9	99.6
	winter & spring	1	0.4	0.4	100.0
Total		243	100.0	100.0	

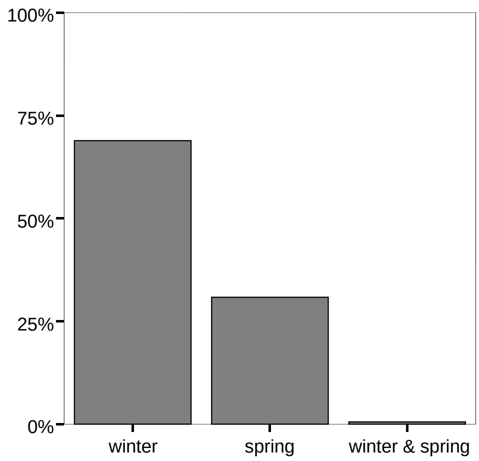

Figure 3.8: Time of tillage in 2012

3.3.4 Maize planting technique

89.6% (223/249) of the farmers used conventional maize planting techniques, 6.4% (16/249) mulch and 2.4% (6/249) used direct sowing. Five of the farmers used two different of the above mentioned maize planting techniques on different fields (Table 3.19, Figure 3.9).

Table 3.19: Maize planting technique in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	conventional planting	223	89.6	89.6	89.6
	mulch	16	6.4	6.4	96.0
	direct sowing	6	2.4	2.4	98.4
	conventional & mulch sowing	3	1.2	1.2	99.6
	mulch & direct sowing	1	0.4	0.4	100.0
Total		249	100.0	100.0	

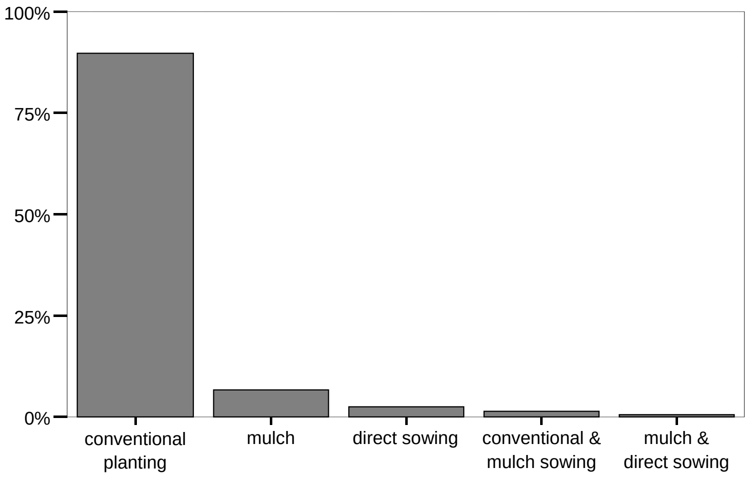

Figure 3.9: Maize planting technique in 2012

3.3.5 Typical weed and pest control practices in maize

Farmers were asked to specify the typical weed and pest control practices in maize at their farms. In conventional maize 92.8% of all farmers (231/249) apply insecticides and 19.5% (45/231) of them apply also insecticides against corn borers. One farmer (0.4%) uses biocontrol treatments, all of them (100.0%, 249/249) use herbicides, 8.4% (21/249) use mechanical weed control and 12.4% (31/249) use fungicides (Table 3.20) in conventional maize.

Table 3.20: Typical weed and pest control practices in maize in 2012

Insecticide(s)		Frequency	Percent
	yes	231	92.8
	no	18	7.2
Total		249	100.0
Insecticide(s) against corn borers		Frequency	Percent
	yes	45	19.5
	no	186	80.5
Total		231	100.0
Use of biocontrol treatments		Frequency	Percent
	yes	1	0.4
	no	248	99.6
Total		249	100.0
Herbicide(s)		Frequency	Percent
	yes	249	100.0
	no	0	0.0
Total		249	100.0
Mechanical weed control		Frequency	Percent
	yes	21	8.4
	no	228	91.6
Total		249	100.0
Fungicide(s)		Frequency	Percent
	yes	31	12.4
	no	218	87.6
Total		249	100.0

3.3.6 Application of fertilizer to maize grown area

All farmers (100%, 249/249) applied fertilizer to the maize grown area (Table 3.21).

Table 3.21: Application of fertilizer to maize grown area in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	249	100.0	100.0	100.0
	no	0	0.0	0.0	100.0
Total		249	100.0	100.0	

3.3.7 Typical time of maize sowing

For quality control and to see if the collected data are plausible the farmers were asked about the typical time of maize sowing. The time of sowing ranged from 1 March 2012 to 7 July 2012 (Table 3.22).

Table 3.22: Typical time of maize sowing in 2012

	Earliest date	Latest date	Mean	Valid N
Sowing from	01.03.12	10.06.12	09.04.12	249
Sowing till	10.03.12	07.07.12	29.04.12	249

3.3.8 Typical time of maize harvest

The question on the typical time of harvest was also asked for quality control and to see if the collected data are within a plausible range. The time of harvest for maize grain ranged from 15 August 2012 to 30 December 2012 and for maize forage from 20 August 2012 to 30 October 2012 (Table 3.23).

Table 3.23: Typical time of maize harvest in 2012

	Earliest date	Latest date	Mean	Valid N
Harvest grain maize from	15.08.12	20.12.12	07.10.12	234
Harvest grain maize till	15.08.12	30.12.12	30.10.12	234
Harvest forage maize from	20.08.12	05.10.12	09.09.12	39
Harvest forage maize till	25.08.12	30.10.12	28.09.12	39

3.4 Part 3: Observations of MON 810

3.4.1 Agricultural practices in MON 810 (compared to conventional maize)

Crop rotation

The crop rotation for MON 810 was specified to be as usual in 95.6% (238/249) of the cases (Table 3.24). 9 (81.8%) of the farmers who changed their crop rotation came from Spain and 2 (18.2%) from Czech Republic. The explanations are listed in Appendix A, in Table A.1.

Table 3.24: Crop rotation for MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	238	95.6	95.6	95.6
	changed	11	4.4	4.4	100.0
Total		249	100.0	100.0	

The valid percentage of changed crop rotation (4.4%) is significantly less than 10% since the resulting P value is less than the level of significance $\alpha = 0.01$ (Table 3.25). Therefore, the null hypothesis $f_{changed} \geq 0.1$ is rejected with a power of 85.9% and no effect on crop rotation is indicated.

Table 3.25: Results of the binomial test for changed crop rotation for MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249			238 (95.6%)	9 (4.4%)	< 0.01

Planting time

The planting time of MON 810 was specified to be as usual compared to conventional maize by 96.4% (240/249) of the farmers (Table 3.26, Figure 3.10). The individual specifications for later planting of MON 810 are given in Appendix A, Table A.2.

Table 3.26: Planting time of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	earlier	0	0.0	0.0	0.0
	as usual	240	96.4	96.4	96.4
	later	9	3.6	3.6	100.0
Total		249	100.0	100.0	

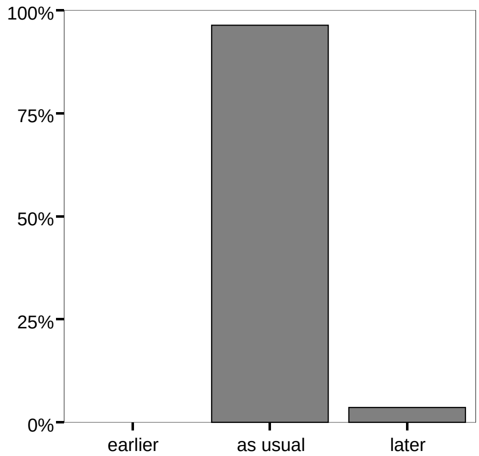

Figure 3.10: Planting time of MON 810 compared to conventional maize in 2012

Both the valid percentage of earlier planting (0.0%) and the valid percentage of later planting (3.6%) are significantly less than 10% since the resulting P values are less than the level of significance $\alpha = 0.01$ (Table 3.27). Therefore, both null hypotheses $f_{earlier} \geq 0.1$ and $f_{later} \geq 0.1$ are rejected with a power of 99.9% for earlier planting and 96.1% for later planting and no effect on time of planting is indicated.

Table 3.27: Results of the binomial test for different planting time for MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	0 (0.0%)	< 0.01	240 (96.4%)	9 (3.6%)	< 0.01

Tillage and planting techniques

The majority of the farmers did not change the tillage and planting technique of MON 810 compared to that used in conventional maize, as reflected in Table 3.28. Only 5 farmers (2.0%, all from Spain) indicated a change. All 5 stated that they tilled the soil for MON 810 in Spring instead of Winter. The individual specifications for changed tillage and planting technique of MON 810 are given in Appendix A, Table A.3.

The valid percentage for changed tillage and planting techniques (2.0%) are significantly less than 10% since the resulting P values are less than the level of significance $\alpha = 0.01$ (Table 3.29). Therefore, the null hypothesis $f_{changed} \geq 0.1$ is rejected with a power of 99.9% and no effect on tillage and planting techniques is indicated.

Table 3.28: Tillage and planting techniques for MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	244	98.0	98.0	98.0
	changed	5	2.0	2.0	100.0
Total		249	100.0	100.0	

Table 3.29: Results of the binomial test for changed tillage and planting techniques for MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249			244 (98.0%)	5 (2.0%)	< 0.01

Insect and corn borer control practices

Insecticides applied in MON 810 fields sorted by their regulatory approval as seed treatment, spray application or microgranules are listed per country in Appendix A, Table A.4. MON 810 received insecticide treatments mainly through seed coatings. Clothianidin, Imidachloprid, Thiametoxam and Fipronil were used for that purpose. Abamectin is the most used active ingredient for spraying. Chlorpyrifos is registered for use as granules and spray, but was used mostly as granules.

All farmers were asked to describe their insect control practices in MON 810 compared to conventional maize in 2012. 82.7% (206/249) specified no change in practices, while 17.3% (43/249) used a different program (Table 3.30).

Table 3.30: Use of insect control in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	similar	206	82.7	82.7	82.7
	different	43	17.3	17.3	100.0
Total		249	100.0	100.0	

The valid percentage of different insect control practices (17.3%) is greater than 10%. The resulting P value is greater than the level of significance $\alpha = 0.01$ (Table 3.31). The null hypothesis $f_{different} \geq 0.1$ is therefore not to reject - an effect on the insect control program is indicated.

The difference arises from farmers using less insecticide applications in general (Table 3.32) as well as from farmers not controlling corn borers any more with conventional insecticide applications (Table 3.33). All individual explanations are given in Appendix A, Table A.5.

The reduced use of conventional insecticides to control corn borers can be anticipated, since MON 810 is specifically designed to control corn borers as *Ostrinia nubilalis* and *Sesamia* spp. Therefore, planting of MON 810 makes insecticide applications for this purpose obsolete.

Table 3.31: Results of the binomial test for different insect control practices in MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249			206 (82.7%)	43 (17.3%)	1.0

Table 3.32: Insect control practices compared to conventional maize in the context of the general use of insecticides in 2012

		Insect control practices in MON 810		
		similar	different	Total
Do you usually use insecticides? (section 3.3.5)	Yes	188	43	231
	No	18	0	18
Total		206	43	249

The difference in the use of general insecticide applications (less was used on MON 810 fields) was reported by farmers as the reduced need for general insecticide treatments in MON 810 fields. This could be explained by the fact that, compared with conventional maize, MON 810 is also less susceptible to Lepidopteran pests other than *Ostrinia nubilalis* and *Sesamia* spp. as described in section 3.4.5. This results in a reduced need for more general insecticide applications.

Weed control practices

The herbicides applied in MON 810 fields are listed in Appendix A, Table A.6. A wide number of herbicides and actives were used. The main actives of herbicides that were cited by the farmers are:

- Terbuthylazine
- Acetochlor
- Nicosulfuron
- Mesotrione
- S-Metolachlor
- Fluroxypyr
- Dicamba
- Isoxaflutol
- Foramsulfuron
- Isoxadifen-ethyl

These all are well-known products used for weed control in maize.

The farmers were asked to describe their weed control practices in MON 810 in 2012 compared to conventional maize. No farmer used a different weed control in MON 810 compared to conventional maize (Table 3.34).

Table 3.33: Corn Borer control practices compared to conventional maize in the context of the general use of insecticides against Corn Borer in 2012

		Corn borer control practices in MON 810		
		similar	different	Total
Do you usually use insecticides against corn borer? (section 3.3.5)	Yes	0	45	45
	No	186	0	186
Total		186	45	231

Table 3.34: Use of weed control in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	similar	249	100.0	100.0	100.0
	different	0	0.0	0.0	100.0
Total		249	100.0	100.0	

Fungal control practices

Fungicides are generally not applied in maize, but all maize usually receives a fungicide seed treatment. In the 2012 survey, as reported in section 3.3.5, 12.4% (31/249) of the farmers stated that fungicides were used for seed treatment in maize, and in some cases they could give information on what kind of fungicide was used. The actives of fungicides that were cited by the farmers are:

- Fludioxonil
- Mefenoxam
- Dithiocarbamate

All named fungicides are commonly used for treatment of maize seed.

No farmer did change the fungicide program of MON 810 compared to that of conventional maize (Table 3.35).

Table 3.35: Use of fungicides on MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	similar	249	100.0	100.0	100.0
	different	0	0.0	0.0	100.0
Total		249	100.0	100.0	

Fertilizer application practice

All farmers answered the question regarding the fertilizer application in MON 810. No farmer used a different program (Table 3.36).

Table 3.36: Fertilizer application practice in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	similar	249	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		249	100.0	100.0	

Irrigation practice

All farmers answered the question regarding the irrigation practice in MON 810, no farmer changed the practice (Table 3.37).

Table 3.37: Irrigation practice in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	similar	249	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		249	100.0	100.0	

Harvest of MON 810

The farmers were asked if they harvested MON 810 earlier or later than conventional maize or as usual. 239 of them (96.0%) responded that no change in harvesting date was applied for MON 810. Only 4.0% (10/249) stated that they harvested MON 810 later (Table 3.38, Figure 3.11). The main reasons given for later harvest of MON 810 is increased flexibility (cropping system, logistics, channeling/coexistence). The full individual feedback of the farmers for later harvesting time is given in Appendix A, Table A.7.

Table 3.38: Harvest of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	earlier	0	0.0	0.0	0.0
	as usual	239	96.0	96.0	96.0
	later	10	4.0	4.0	100.0
Total		249	100.0	100.0	

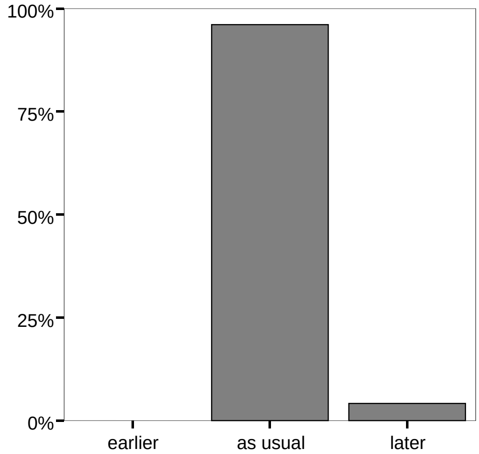

Figure 3.11: Harvest of MON 810 compared to conventional maize in 2012

The valid percentage of later harvest (4.0%) does not exceed the 10% threshold and the resulting P values are not greater than the level of significance $\alpha = 0.01$ (Table 3.39) and therefore, the corresponding null hypotheses could be rejected for $f_{later} \geq 0.1$ with a power of 92.1%. No effect on the harvest time of MON 810 is indicated.

Table 3.39: Results of the binomial tests for different harvesting time of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	0 (0.0%)	< 0.01	239 (95.2%)	10 (4.0%)	< 0.01

Assessment of differences in agricultural practices in MON 810 (compared to conventional maize)

Agricultural practices in MON 810 (compared to conventional maize) were not changed with regard to crop rotation, planting time, tillage and planting techniques, weed control, fungal control, fertilizer application, irrigation and harvest time of MON 810. Differences exist in the aspects: Insect and corn borer control of MON 810.

The difference in insect and corn borer control arises from farmers not controlling corn borers any more with conventional insecticide applications, because MON 810 is specifically designed to control corn borers as *Ostrinia nubilalis* and *Sesamia* spp. Furthermore, less insecticides were used in general since MON 810 is also less susceptible to several Lepidopteran pests other than *Ostrinia nubilalis* and *Sesamia* spp.

3.4.2 Characteristics of MON 810 in the field (compared to conventional maize)

Germination vigor

5.6% (14/249) of all farmers assessed the germination of MON 810 to be more vigorous, one farmer (0.4%) assessed it to be less vigorous (Table 3.40, Figure 3.12).

Table 3.40: Germination of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less vigorous	1	0.4	0.4	0.4
	as usual	234	94.0	94.0	94.4
	more vigorous	14	5.6	5.6	100.0
Total		249	100.0	100.0	

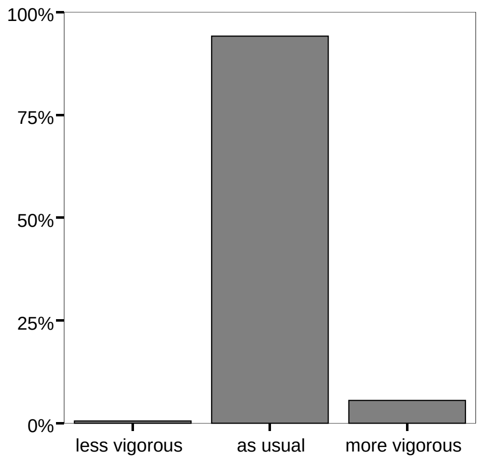

Figure 3.12: Germination of MON 810 compared to conventional maize in 2012

The valid percentages of less and more vigorous germination do not exceed the 10% threshold. The P values for both do not exceed the level of significance $\alpha = 0.01$, i.e. both null hypotheses could be rejected with a power of 99.9% for $f_{less\ vigorous} \geq 0.1$ and 57.0% for $f_{more\ vigourous} \geq 0.1$ (Table 3.41) and no effect on the germination vigor is indicated. Individual explanations for the observations of the farmers are given in Appendix A, Table A.8.

Table 3.41: Results of the binomial tests for different germination vigor of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	1 (0.4%)	< 0.01	234 (94.0%)	14 (5.6%)	< 0.01

Time to emergence

0.8% (2/249) of the farmers assessed the time to emergence to be accelerated for MON 810, while one farmer (0.4%, 1/249) indicated the time to emergence to be delayed (Table 3.42, Figure 3.13).

Table 3.42: Time to emergence of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	2	0.8	0.8	0.8
	as usual	246	98.8	98.8	99.6
	delayed	1	0.4	0.4	100.0
Total		249	100.0	100.0	

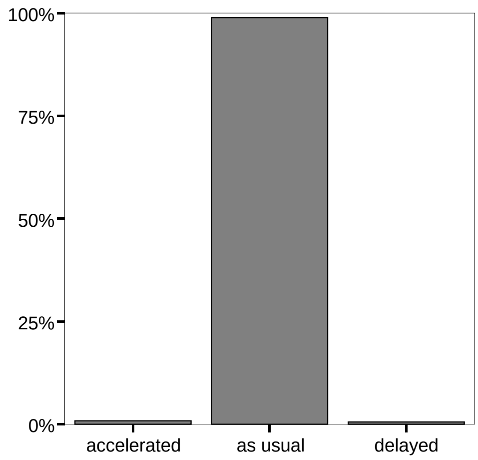

Figure 3.13: Time to emergence of MON 810 compared to conventional maize in 2012

Valid percentages for both accelerated and delayed time to emergence do not exceed the 10% threshold. The resulting P values are less than the level of significance $\alpha = 0.01$ for both null hypotheses (Table 3.43), so they could be rejected with a power of 99.9% for $f_{accelerated} \geq 0.1$ and $f_{delayed} \geq 0.1$ and no effect is indicated. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.43: Results of the binomial tests for different time to emergence of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	2 (0.8%)	< 0.01	246 (98.8%)	1 (0.4%)	< 0.01

Time to male flowering

Time to male flowering was assessed to be as usual in 98.0% (244/249) of all cases (Table 3.44, Figure 3.14).

Table 3.44: Time to male flowering of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	2	0.8	0.8	0.8
	as usual	244	98.0	98.0	98.8
	delayed	3	1.2	1.2	100.0
Total		249	100.0	100.0	

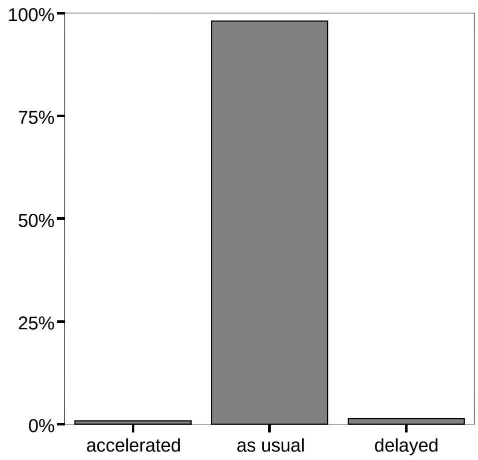

Figure 3.14: Time to male flowering of MON 810 compared to conventional maize in 2012

Neither the valid percentage of accelerated time to male flowering (0.8%), nor the valid percentage of delayed time to male flowering (1.2%) exceed the 10% threshold and the resulting P values are less than the level of significance $\alpha = 0.01$ (Table 3.45). The null hypotheses $f_{accelerated} \geq 0.1$ and $f_{delayed} \geq 0.1$ could be rejected with a power of 99.9%. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.45: Results of the binomial tests for different time to male flowering of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	2 (0.8%)	< 0.01	244 (98.0%)	3 (1.2%)	< 0.01

Plant growth and development

Plant growth and development was accelerated in 1.6% (4/249) and delayed in 2.0% (5/249) of all cases (Table 3.46, Figure 3.15).

Table 3.46: Plant growth and development of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	4	1.6	1.6	1.6
	as usual	240	96.4	96.4	98.0
	delayed	5	2.0	2.0	100.0
Total		249	100.0	100.0	

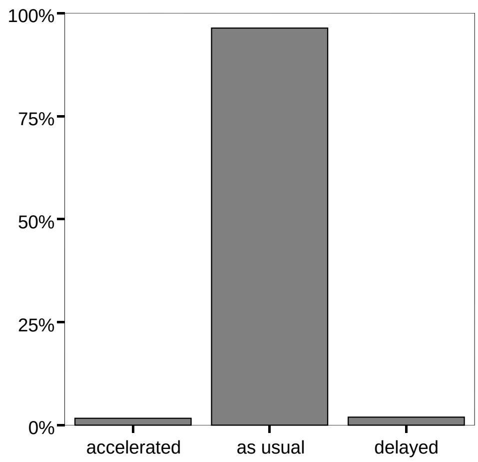

Figure 3.15: Plant growth and development of MON 810 compared to conventional maize in 2012

Both valid percentages for accelerated (1.6%) and delayed (2.0%) plant growth and development are less than the 10% threshold. The resulting P value is less than the level of significance $\alpha = 0.01$ (Table 3.47) for $f_{accelerated}$ and $f_{delayed}$. Therefore both null hypothesis $f_{accelerated} \geq 0.1$ and $f_{delayed} \geq 0.1$ can be rejected with a power of 99.9%. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.47: Results of the binomial tests for different plant growth and development of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	4 (1.6%)	< 0.01	240 (98.4%)	5 (2.0%)	< 0.01

Incidence of stalk/root lodging

Incidence of stalk/root lodging was assessed to be less frequent in MON 810 compared to conventional maize in 28.1% (70/249) of all cases (Table 3.48, Figure 3.16).

Table 3.48: Incidence of stalk/root lodging of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less often	70	28.1	28.1	28.1
	as usual	179	71.9	71.9	100.0
	more often	0	0.0	0.0	100.0
Total		249	100.0	100.0	

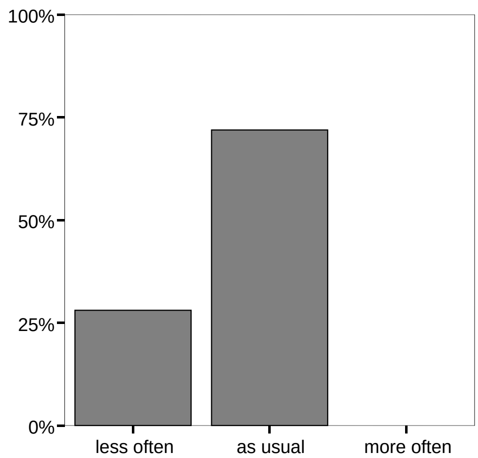

Figure 3.16: Incidence of stalk/root lodging of MON 810 compared to conventional maize in 2012

The valid percentage of higher incidence of stalk/root lodging (0.0%) does not exceed the 10% threshold. The resulting P value is smaller than the level of significance $\alpha = 0.01$ (Table 3.49) and therefore, the corresponding null hypothesis $f_{more} \geq 0.1$ could be rejected with a power of 100.0%. But the valid percentage of lower incidence of stalk/root lodging (28.1%) does exceed the 10% threshold. The resulting P value is greater than the level of significance $\alpha = 0.01$ and therefore, the corresponding null hypothesis $f_{less} \geq 0.1$ could not be rejected and clearly indicates an effect on the incidence of stalk/root lodging of MON 810. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.49: Results of the binomial tests for different incidence of stalk/root lodging of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	70 (28.1%)	1.0	179 (71.9%)	0 (0.0%)	< 0.01

Time to maturity

16.1% (32/249) of the farmers assessed the time to maturity to be delayed for MON 810, while no farmer (0.0%, 0/249) assed it to be accelerated (Table 3.50, Figure 3.17).

Table 3.50: Time to maturity of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	0	0.0	0.0	0.0
	as usual	209	83.9	83.9	83.9
	delayed	40	16.1	16.1	100.0
Total		249	100.0	100.0	

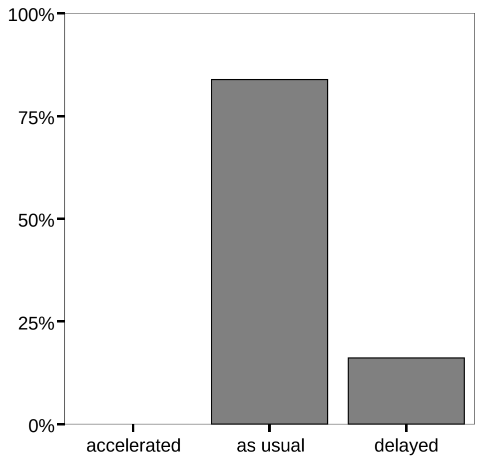

Figure 3.17: Time to maturity of MON 810 compared to conventional maize in 2012

The valid percentage of accelerated time to maturity (0.0%) does not exceed the 10% threshold. The resulting P value is smaller than the level of significance $\alpha = 0.01$ (Table 3.51) and the null hypothesis $f_{accelerated} \geq 0.1$ can be rejected with a power of 100.0%. But the valid percentage of delayed time to maturity (16.1%) does exceed the 10% threshold. The resulting P value is greater than level of significance $\alpha = 0.01$ and therefore, the corresponding null hypothesis $f_{delayed} \geq 0.1$

could not be rejected and clearly indicates an effect on the time to maturity of MON 810. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.51: Results of the binomial tests for different time to maturity of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	0 (0.0%)	< 0.01	209 (83.9%)	40 (16.1%)	0.999

Yield

Yield was higher in 43.0% (107/249) of all cases (Table 3.52, Figure 3.18).

Table 3.52: Yield of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	lower yield	6	2.4	2.4	2.4
	as usual	136	54.6	54.6	57.0
	higher yield	107	43.0	43.0	100.0
Total		249	100.0	100.0	

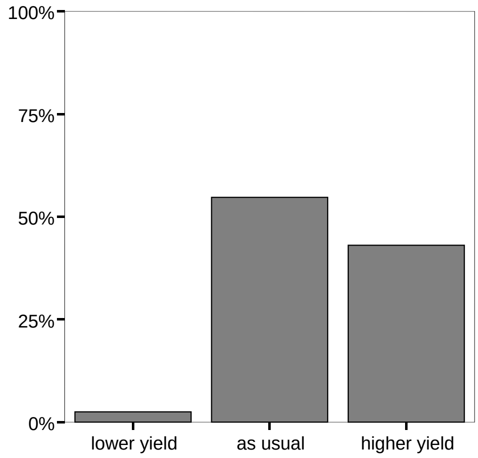

Figure 3.18: Yield of MON 810 compared to conventional maize in 2012

The valid percentage of lower yield (2.4%) does not exceed the 10% threshold. The resulting P value is smaller the than level of significance $\alpha = 0.01$ (Table 3.53) and therefore, the corresponding null hypothesis $f_{lower} \geq 0.1$ could be rejected with a power of 99.9%. But the valid percentage of higher yield (43.0%) does exceed the 10% threshold. The resulting P value is greater the than level of significance $\alpha = 0.01$ and therefore, the corresponding null hypothesis $f_{higher} \geq 0.1$ could not be rejected and clearly indicates an effect on yield of MON 810. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.53: Results of the binomial tests for different yield of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	6 (2.4%)	< 0.01	136 (54.6%)	107 (43.0%)	1.0

Occurrence of volunteers

The occurrence of volunteers was assessed to be less frequent for MON 810 than for conventional maize in 4.2% (12/237) of the valid cases (Table 3.54, Figure 3.19).

Table 3.54: Occurrence of MON 810 volunteers compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less often	10	4.0	4.2	4.2
	as usual	227	91.2	95.8	100.0
	more often	0	0.0	0.0	100.0
	Total	237	95.2	100.0	
Missing	no statement	12	4.8		
Total		249	100.0		

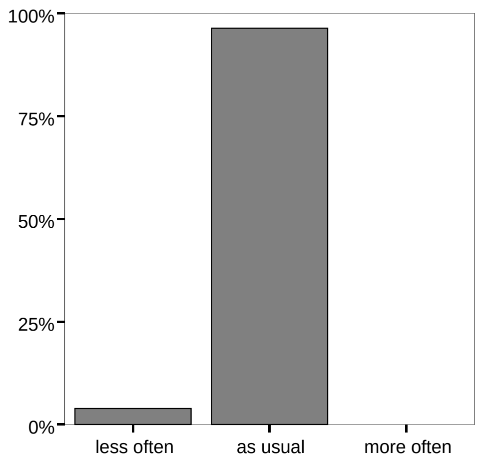

Figure 3.19: Occurrence of MON 810 volunteers compared to conventional maize in 2012

The valid percentage of lower and higher occurrence of volunteers does not exceed the 10% threshold. The resulting P values are smaller than the level of significance $\alpha = 0.01$ (Table 3.55) and therefore, the corresponding null hypotheses could be rejected, $f_{less} \geq 0.1$ with a power of 86.9% and $f_{more} \geq 0.1$ with a power of 99.9% and no effect on occurrence of MON 810 volunteers is indicated. Individual explanations for these observations are given in Appendix A, Table A.8.

Table 3.55: Results of the binomial tests for different occurrence of MON 810 volunteers compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
236	10 (4.2%)	< 0.01	227 (95.8%)	0 (0.0%)	< 0.01

Assessment of differences in the characteristics of MON 810 in the field (compared to conventional maize)

A summary of these results for the characteristics of MON 810 in the field compared to conventional maize shows:

- **an unchanged germination,**
- **an unchanged time to emergence,**
- **an unchanged time to male flowering,**
- **an unchanged plant growth and development,**
- **a lower incidence of stalk/root lodging,**
- **a delayed time to maturity,**
- **a higher yield and**
- **an unchanged occurrence of MON 810 volunteers.**

The lack of differences in these characters underlines the substantial equivalence of MON 810 to comparable conventional lines, as evidenced by recent genomic and proteomic analyses (Coll et al. 2008 [8], 2009 [9], 2010 [10], 2011 [11]).

Corn borer damage affects maturation and especially yield negatively, therefore the differences in these monitoring characters can be explained by the absence of corn borer damage.

The difference in the incidence of stalk/root lodging can also be explained this way. Therefore, differences in these parameters are anticipated and only underline the effectiveness of corn borer control.

The longer time to maturity might also be an effect of corn borer control: in the presence of pests, plants need to reach maturity faster. In the absence of pest pressure, plants can maximize the output of biomass and have a longer period of seed set and ripening. This could explain the longer time to maturity reported for MON 810 by 16.1% of farmers. The low percentage indicates that this phenomenon is restricted to areas of pest pressure. If this was a more general effect, the valid percentage of farmers reporting on this would be much higher.

3.4.3 Disease susceptibility in MON 810 fields (compared to conventional maize)

Farmers assessed MON 810 to be less susceptible to diseases, 17.3% (43/249) (Table 3.56, Figure 3.20).

Table 3.56: Disease susceptibility in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less susceptible	43	17.3	17.3	17.3
	as usual	206	82.7	82.7	100.0
	more susceptible	0	0.0	0.0	100.0
Total		249	100.0	100.0	

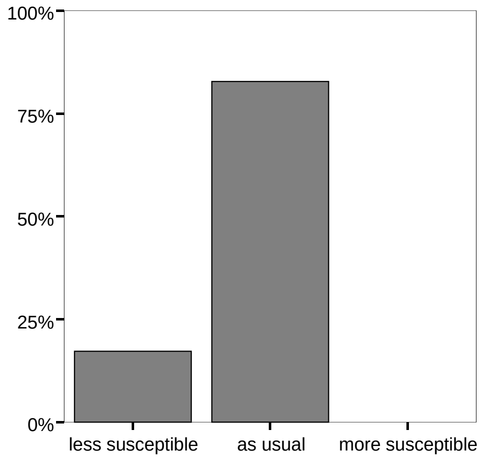

Figure 3.20: Disease susceptibility in MON 810 compared to conventional maize in 2012

The valid percentage of higher disease susceptibility (0.0%) does not exceed the 10% threshold. The resulting P value is samller than the level of significance $\alpha = 0.01$ (Table 3.57) and therefore, the corresponding null hypothesis $f_{more} \geq 0.1$ could be rejected with a power of 100%. But the valid percentage of lower disease susceptibility (17.3%) does exceed the 10% threshold. The resulting P value is greater than the level of significance $\alpha = 0.01$ and therefore, the corresponding null hypothesis $f_{less} \geq 0.1$ could not be rejected and clearly indicates an effect on disease susceptibility.

Table 3.57: Results of the binomial tests for different disease susceptibility of MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	43 (17.3%)	1.0	206 (82.7%)	0 (0.0%)	< 0.01

The 43 farmers that answered different from "as usual" were asked to specify the difference in disease susceptibility by listing the diseases with an explanation. Table 3.58 lists the reported diseases with an assessment of the disease susceptibility of MON 810, compared to conventional maize. This list shows that the lower disease susceptibility was predominantly attributed to a lower susceptibility to *Fusarium* spp. (8.4%, 21/249), *Ustilago maydis* (7.2%, 18/249); to a lesser extent, a lower susceptibility to *Helminthosporium* spp. (3.2%, 8/249), as well as some other fungal, bacterial and viral diseases that also were mentioned.

Table 3.58: Specification of differences in disease susceptibility in MON 810 compared to conventional maize in 2012

Group	Species	Less
Fungus	*Fusarium* spp.	21
	Ustilago maydis	18
	Helminthosporium spp.	8
	Hongos generos Fusarium	6
	Cephalosporium spp.	5
	Gibberella zeae	3
	Puccinia sorghi	2
	Rhizoctonia solani	2
Bacteria	*Erwinia*	1
Viruses	*MDMV* and *MRDV*	1

Additional comments on disease susceptibility are given in Appendix A, Table A.10.

Assessment of differences in disease susceptibility in MON 810 fields (compared to conventional maize)

The differences were indicated to have been observed for a number of different fungal species, most notably *Fusarium* spp., *Ustilago maydis* and *Helminthosporium* spp.

This observation is not surprising, since it has been well established that feeding holes and tunnels of the corn borer serve as entry points for secondary fungal infections, especially of the *Fusarium* spp. *Ustilago maydis* also has a high incidence especially with stressed plants (water stress, mechanical wounding, insect feeding damage), so that any reduction of a stress factor would immediately result in a lower incidence of disease. Therefore, the observed differences can be explained by corn borer control and confirm previous observations of lower fungal infections in MON 810 reported in the scientific literature (Munkvold et al., 1999 [19]; Dowd, 2000 [12]; Bakan et al., 2002 [1]; Hammond et al., 2003 [16]; Wu, 2006 [50]). The farmers' testimony (Appendix A, Table A.10) thus corroborate previous findings.

3.4.4 Insect pest control in MON 810 fields (compared to conventional maize)

The insect pest control of *Ostrinia nubilalis* (European corn borer) was assessed to be very good or good in 100.0% (246/246) of the valid cases (Table 3.59, Figure 3.21).

Table 3.59: Insect pest control of *Ostrinia nubilalis* in MON 810 in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	weak	0	0.0	0.0	0.0
	good	22	8.8	8.9	8.9
	very good	224	90.0	91.1	100.0
	Total	246	98.8	100.0	
Missing	do not know	3	1.2		
Total		249	100.0		

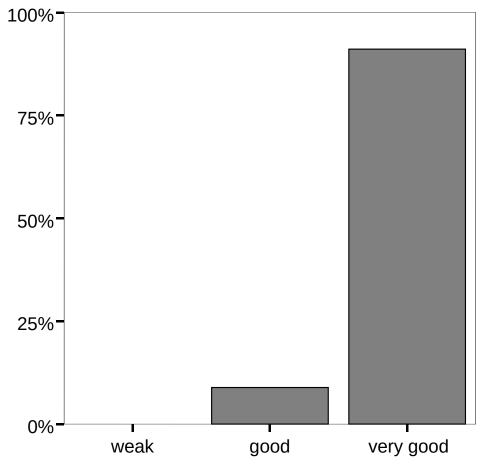

Figure 3.21: Insect pest control of *Ostrinia nubilalis* in MON 810 in 2012

This high percentage clearly indicates an effect (Table 3.60). The null hypothesis $f_{very\ good} \leq 0.1$ cannot be rejected. This effect is expected because MON 810 is genetically modified to be protected against this pest.

Table 3.60: Results of the binomial tests for Insect pest control of *Ostrinia nubilalis* in MON 810 in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
246	0 (0.0%)	< 0.01	22 (8.9%)	224 (91.1%)	1.0

100.0% (216/216) of the farmers who gave a valid answer attested a good or very good control of *Sesamia* spp. (Table 3.61, Figure 3.22). The high percentage of missing values in efficacy of MON 810 against *Sesamia* spp. (Pink Borer) resulted from the fact that this question was not answered in the Czech Republic, Slovakia and Romania since the pest is just not present in these countries.

Table 3.61: Insect pest control of *Sesamia* spp. in MON 810 in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	weak	0	0.0	0.0	0.0
	good	20	8.0	9.3	9.3
	very good	196	78.7	90.7	100.0
	Total	216	86.7	100.0	
Missing	No statement	33	13.3		
Total		249	100.0		

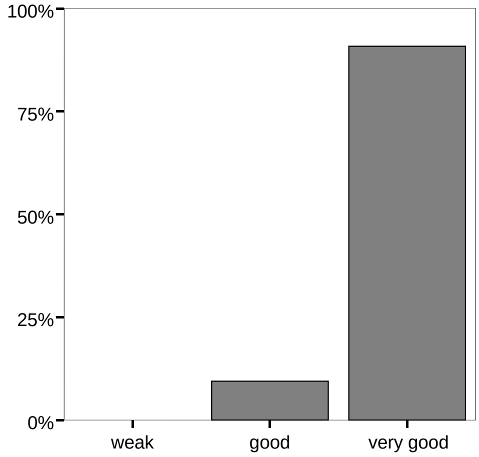

Figure 3.22: Insect pest control of *Sesamia* spp. in MON 810 in 2012

This high percentage clearly indicates an effect (Table 3.62). The null hypothesis $f_{very\ good} \leq 0.1$ can not be rejected. This effect is expected because MON 810 is genetically modified to be protected against this pest.

Table 3.62: Results of the binomial tests for Insect pest control of *Sesamia* spp. in MON 810 in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
216	0 (0.0%)	< 0.01	20 (9.3%)	196 (90.7%)	1.0

Additional comments on insect pest control are listed in Appendix A, Table A.11.

Assessment of insect pest control in MON 810 fields (compared to conventional maize)

The results show that both pests (*Ostrinia nubilalis* and *Sesamia* spp.) are effectively controlled by MON 810.

3.4.5 Other pests (other than *Ostrinia nubilalis* and *Sesamia* spp.) in MON 810 fields (compared to conventional maize)

Farmers assessed MON 810 to be less susceptible to pests in 21.3% (53/249) of all cases (Table 3.63, Figure 3.23). One farmer (0.4%) assesst the MON 810 plants to be more susceptible to pests.

Table 3.63: Pest susceptibility of MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less susceptible	53	21.3	21.3	21.3
	as usual	195	78.3	78.3	99.6
	more susceptible	1	0.4	0.4	100.0
Total		249	100.0		

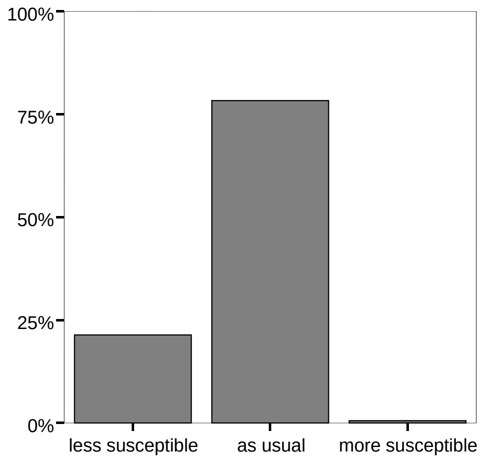

Figure 3.23: Pest susceptibility of MON 810 compared to conventional maize in 2012

The valid percentage of higher pest susceptibility (0.4%) does not exceed the 10% threshold and the resulting P value is smaller than the level of significance $\alpha = 0.01$, i.e. the null hypotheses $f_{more\ susceptible} \geq 0.1$ could be rejected with a power of 99.9%. But the valid percentage of lower pest susceptibility (21.3%) does exceed the 10% threshold. The resulting P value of lower pest susceptibility is greater than the level of significance $\alpha = 0.01$ (Table 3.64) and therefore, the corresponding null hypothesis $f_{less} \geq 0.1$ could not be rejected and indicates an effect on pest susceptibility.

Table 3.64: Results of the binomial tests for different pest susceptibility in MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
249	53 (21.3%)	1.0	194 (78.3%)	1 (0.4%)	< 0.01

The 54 farmers that answered different from as usual were asked to specify the difference in pest susceptibility by listing the pests with an explanation. Table 3.65 lists the reported pests with an assessment of the pest susceptibility of MON 810, compared to conventional maize. This list shows that the lower pest susceptibility was predominantly attributed to a lower susceptibility to pests of the order Lepidoptera.

Table 3.65: Specification of differences in pest susceptibility in MON 810 compared to conventional maize in 2012

Order	Name	different	less	more
Lepidoptera	*Agrotis* spp.	36	36	-
	Spodoptera spp.	14	14	-
	Mythimna spp.	5	5	-
	Heliotis	1	1	-
Arachnida	*Tetranychus* spp.	19	18	1
Coleoptera	*Diabrotica* spp.	3	3	-
Diptera	Mosquitos	1	1	-
Hemiptera	Aphids	1	1	-

If the answers concerning Lepidopteran pests are removed the pest susceptibility is $As\ ususal$ in 88.2% of the left valid cases (Table 3.66, Figure 3.24).

Table 3.66: Pest susceptibility of MON 810 compared to conventional maize in 2012 when Lepidopteran pests are removed

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less susceptible	25	11.3	11.3	11.3
	as usual	195	88.2	88.2	99.5
	more susceptible	1	0.5	0.5	100.0
Total		221	100.0		

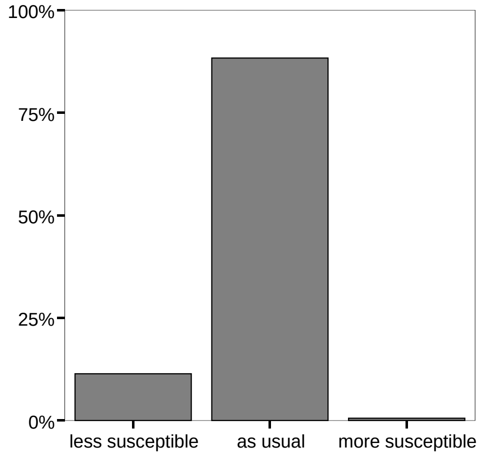

Figure 3.24: Pest susceptibility of MON 810 compared to conventional maize in 2012 when Lepidopteran pests are removed

The data on susceptibility to other pests than Lepidoptera were analysed separately for each order of pests. As shown in Table 3.67 there is an effect indicated on susceptibility to Arachnida, i.e. the red spider mite *Tetranychus urticae*. Here the percentage of lower susceptibility (8.1%) does not exceed the threshold of 10%, but the resulting P value ($p = 0.213$) is greater than the level of significance $\alpha = 0.01$. For the frequency of lower susceptibility to Arachnida the lower 99% confidence interval limit is 0.034, the upper limit is 0.193, i.e exeeds the threshold of 10%. To all other orders of pests no effect is indicated.

Table 3.67: Results of the binomial tests for single order susceptibilities of MON 810 compared to conventional maize in 2012 when Lepidopteran pests are removed

	N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
Arachnida	221	18 (8.1%)	0.213	202 (91.4%)	1 (0.5%)	< 0.01
Coleoptera	221	3 (1.4%)	< 0.01	218 (98.6%)	0 (0.0%)	< 0.01
Diptera	221	1 (0.5%)	< 0.01	220 (99.5%)	0 (0.0%)	< 0.01
Hemipthera	221	1 (0.5%)	< 0.01	220 (99.5%)	0 (0.0%)	< 0.01

Additional comments on other pest (other than *Ostrinia nubilalis* and *Sesamia* spp.) are given in Appendix A, Table A.12.

Assessment of differences in susceptibility to other pests in MON 810 fields (compared to conventional maize)

The data show that the susceptibility to other pests in MON 810 is unchanged, except for those belonging to the order of Lepidoptera and Arachnia, i.e. the red spider mite *Tetranychus urticae*.

The reduced susceptibility of MON 810 to Lepidoptera is not surprising, given the plethora of scientific studies on laboratory and field experiments showing that the Cry protein expressed in MON 810 does not have a negative effect on any insects other than those belonging to the order for which they specifically have toxic properties (Marvier et al., 2007 [18]; Wolfenbarger et al., 2008 [49]). The monitoring data thus corroborate the conclusions drawn during the environmental risk assessment and ongoing research.

The farmers indicated a reduced susceptibility of MON 810 to Arachnida, i.e. the red spider mite *Tetranychus urticae*. This secondary pest is exposed to the Cry1Ab in MON 810, but is not negatively affected by it, which is why it is commonly used in tri-trophic feeding experiments as a means to expose predators to Cry-proteins [15]. Its reported reduction in MON 810 fields can be attributed to (i) the proven selectivity of MON 810 towards the European corn borer and (ii) the consequently reported reduced application of insecticides against the target pest, which together lead to (iii) an enhanced complex of bio-control organisms preying upon the *Tetranychus* population (and other pests) in the field. Populations of both pests and predators fluctuate from year to year, and the populations of predators and parasitoids typically take time to develop stable populations of higher densities. The populations depend upon each other and the trophic network needs time to adapt to the new environmental conditions (i.e. no insecticide sprays). It is therefore not surprising that increasingly more farmers report a reduction of *Tetranychus* in MON 810 fields over the last years. These observations and interpretations are in line with the scientific literature that clearly shows the compatibility of Bt-plants with biological control in the field (Musser & Shelton, 2003 [20]; Romeis et al., 2006 [29]; Romeis et al., 2009 [30]; Lundgren et al., 2009 [17]).

3.4.6 Weed pressure in MON 810 fields (compared to conventional maize)

No farmer observed a difference for weed pressure in MON 810 fields compared to conventional fields (Table 3.68).

Table 3.68: Weed pressure in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less weeds	0	0.0	0.0	0.0
	as usual	249	100.0	100.0	100.0
	more weeds	0	0.0	0.0	100.0
Total		249	100.0	100.0	

The farmers were asked to name the three most abundant weeds in their MON 810 fields. The six most named weeds are

- *Abutilon* spp.
- *Sorghum halapense*
- *Echinocloa* spp.
- *Setaria* spp.
- *Chenopodium* spp.
- *Amaranthus* spp.

All named weeds and the corresponding frequencies of nomination are listed in Appendix A, Table A.13.

Assessment of differences in weed pressure in MON 810 fields (compared to conventional maize)

It is not surprising that the weed pressure in MON 810 fields has been described to be similar to that in conventional maize. In accordance with the observations described in Section 3.4.1, no changes in weed control practices were reported in MON 810 fields compared to conventional maize fields.

3.4.7 Occurrence of wildlife in MON 810 fields (compared to conventional maize)

Occurrence of non target insects

Farmers assessed the occurrence of non target insects in MON 810 fields to be as usual in 100.0% (241/241) of the valid cases (Table 3.69.

Table 3.69: Occurrence of non target insects in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	0	0.0	0.0	0.0
	as usual	241	96.8	100.0	100.0
	more	0	0.0	0.0	100.0
	Total	241	96.8	100.0	
Missing	do not know	8	3.2		
Total		249	100.0		

Occurrence of birds

Farmers assessed the occurrence of birds in MON 810 fields to be as usual in 100.0% (241/241) of the valid cases (Table 3.70.

Table 3.70: Occurrence of birds in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	0	0.0	0.0	0.0
	as usual	241	96.8	100.0	100.0
	more	0	0.0	0.0	100.0
	Total	241	96.8	100.0	
Missing	do not know	8	3.2		
Total		249	100.0		

Occurrence of mammals

Farmers assessed the occurrence of mammals in MON 810 fields to be as usual in 99.6% (242/243) of the valid cases. At one MON 810 field (0.4%, 1/243) less mammals were observed (Table 3.71, Figure 3.25). The farmer stated that there was a "bigger presence of wild boars in the conventional maize fields since there are maize ears in the soil".

Table 3.71: Occurrence of mammals in MON 810 compared to conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	1	0.4	0.4	0.4
	as usual	242	97.2	99.6	100.0
	more	0	0.0	0.0	100.0
	Total	243	97.6	100.0	
Missing	do not know	6	2.4		
Total		249	100.0		

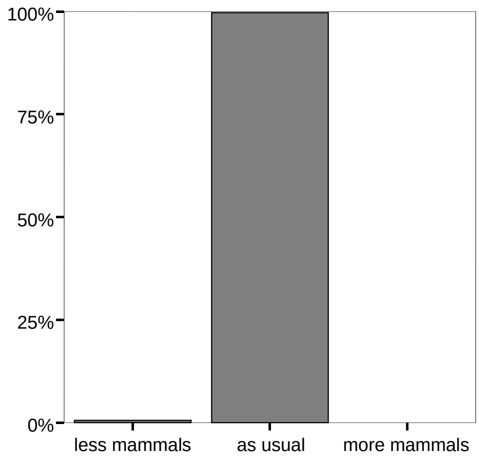

Figure 3.25: Occurrence of mammals in MON 810 compared to conventional maize in 2012

Valid percentages for both more and less birds do not exceed the 10% threshold. The resulting P values are less than the level of significance $\alpha = 0.01$ (Table 3.72). Therefore, the null hypotheses $f_{more} \geq 0.1$ and $f_{less} \geq 0.1$ are rejected with a power of 99.9% and no effect on occurrence of mammals is indicated.

Table 3.72: Results of the binomial tests for different occurrence of mammals in MON 810 compared to conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
243	1 (0.4%)	< 0.01	242 (99.6%)	0 (0.0%)	< 0.01

Assessment of differences in occurrence of wildlife in MON 810 fields (compared to conventional maize)

The occurrence of wildlife in MON 810 is reported to be unchanged for non target insects, birds and mammals.
These results again underline the specificity of the expressed Cry protein towards Lepidoptera, exhibiting no effect on other wildlife, especially non target insects. MON 810 thus is substantially equivalent to conventional maize and hosts the same wildlife. Birds are dependent on insects and wild plants in the agricultural landscape, and are a good indicator for larger scale level effects. The same holds true for mammals, although their occurrence in maize is limited. Studies have shown that no impact on mammals caused by the consumption of MON 810 is to be expected (Shimada et al., 2003 [39], 2006a [40], 2006b [41]; Stumpff et al., 2007 [44]; Bondzio et al., 2008 [5]).

3.4.8 Feed use of MON 810 (if previous year experience with MON 810)

12.9% (32/249) of the asked farmers used the harvest of MON 810 to feed their animals (Table 3.73). These data reflect only the range of feeding. We assume that only farmers that cultivate silage maize feed them to their livestock. That could be the reason why only 12.9% of the surveyed farmers fed MON 810, but there are no strong data supporting this assumption.

Table 3.73: Use of MON 810 harvest for animal feed in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	32	12.9	12.9	12.9
	no	217	87.1	87.1	100.0
Total		249	100.0	100.0	

10.3% (3/29) of the farmers who gave a valid answer to the question on the performance of the animals fed MON 810 observed a different performance of them compared to the animals fed conventional maize (Table 3.74, Figure 3.26).

Table 3.74: Performance of the animals fed MON 810 compared to the animals fed conventional maize in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	26	81.3	89.7	89.7
	different	3	9.4	10.3	100.0
	Total	29	90.6	100.0	
Missing	do not know	3	9.4		
Total		32	100.0		

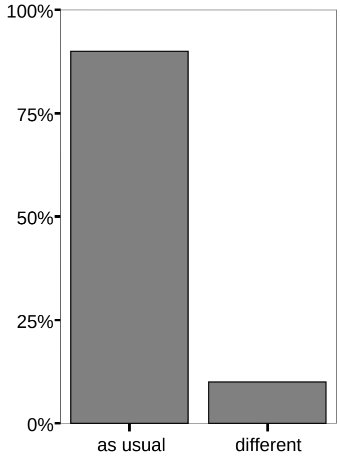

Figure 3.26: Performance of the animals fed MON 810 compared to the animals fed conventional maize in 2012

The valid percentage for different performance of the animals fed MON 810 does exceed the 10% threshold, and the P value is greater than the level of significance $\alpha = 0.01$ (Table 3.75). The null hypothesis for $f_{less} \geq 0.1$ cannot be rejected, so an effect on performance of animals fed MON 810 is indicated.

Table 3.75: Results of the binomial test for different performance of the animals fed MON 810 compared to the animals fed conventional maize in 2012

N valid	$Minus$	P for $p_0 = 0.1$	$As\ usual$	$Plus$	P for $p_0 = 0.1$
29			26 (89.7%)	3 (10.3%)	0.671

Assessment of differences in feed use of MON 810 (if previous year experience with MON 810)

Three farmers from Czech Republic (Appendix A, Table A.15) reported a better health of their animals when fed MON 810, because of a lower incidence of mycotoxins in the feed (due to lower ECB feeding damage on the plant).

Mycotoxin contaminated animal feed leads to food refusal, lower food conversion, increased disease in animals, lower weight gain and overall diminished health of animals. A reduction of the incidence and level of mycotoxins in MON 810 is thus beneficial to the animals and led to a difference in animal performance (Steinke et al., 2010 [43]; Buzoianu et al., 2012 [6]; Walsh et al., 2012 [45]).

3.4.9 Any additional remarks or observations

In this season no farmer made a comment on additional remarks or observations, i.e. no unexpected adverse effects are reported.

3.5 Part 4: Implementation of *Bt* maize specific measures

3.5.1 Information on good agricultural practices on MON 810

96.4% (240/249) of the farmers reported to have been informed about the good agricultural practices applicable to MON 810 (Table 3.76).

Table 3.76: Information on good agricultural practices in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	240	96.4	96.4	96.4
	no	9	3.6	3.6	100.0
Total		249.0	100.0	100.0	

95.8% (230/240) of the farmers considered the training sessions to be either useful or very useful (Table 3.77). This information indicates that the great majority of the farmers had been exposed to a valuable training concerning MON 810.

Table 3.77: Evaluation of training sessions in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	very useful	89	35.7	37.1	37.1
	useful	141	56.6	58.8	95.8
	not useful	10	4.0	4.2	100.0
	Total	240	96.4	100.0	
Missing	No statement	9	3.6		
Total		249.0	100.0		

3.5.2 Seed

The question "was the bag labeled with accompanying documentation indicating that the product is genetically modified maize MON 810" was answered with "yes" in all cases. This indicated that the bags were labeled appropriately and that the label and the accompanying documentation were clear to the farmers.

The great majority of the farmers (90.8%) reported that they are following the label recommendations on the seed bags (Table 3.78). 23 farmers (9.2%) from Spain admitted that they did not follow the label recommendation, in the most cases they didn't plant a refuge.

Deviations from the label recommendations are listed in Appendix A, Table A.16.

Table 3.78: Compliance with label recommendations in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	226	90.8	90.8	90.8
	no	23	9.2	9.2	100.0
Total		249	100.0	100.0	

3.5.3 Prevention of insect resistance

While 8.8% (22/249) of the farmers did not plant a refuge because they had less than 5 ha of maize in the farm (the Insect Resistance Management Plan states that no refuge is required if less than 5 hectares are planted), 81.5% (203/249) did plant a refuge (Table 3.79). 9.6% (24/249) of the farmers reported that they did not plant a refuge. So 90.4% (225/249) of the farmers did follow the label recommendations, which nearly corresponds to the 90.8% (226/249) of all farmers claiming to be compliant with them (Table 3.78). The one that was compliant with the recommendations, but did not plant a refuge stated the he has "small fields of less than 5 hectares each one and then it is not necessary to plant a refuge".

Table 3.79: Plant refuge in 2012

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	203	81.5	81.5	81.5
	no, because the surface *Bt* maize is < 5 ha	22	8.8	8.8	90.4
	no	24	9.6	9.6	100.0
Total		249	100.0	100.0	

In Spain in 2012, among the farmers who were required to plant a refuge (i.e. farm growing more than 5 ha of maize), 84.4% of them (130/154) did it (Table 3.80).

Table 3.80: Refuge implementation per country in 2012

	Country	Yes	No, because the surface of *Bt* maize is < 5 ha	No	Total
Valid	Spain	130	21	24	175
	Portugal	41	0	0	41
	Czech Republic	22	0	0	22
	Slovakia	1	0	0	1
	Romania	9	1	0	10
Total		203	22	24	249

Due to the continuous and intensive training of farmers about implementing a refuge the allover compliance this year is on a high level. In Spain 13.7% (24/130) of the farmers did not plant a refuge. The farmers gave mainly two reasons for not planting a refuge. The first is that the farmer had no or not enough information about the technical guidelines (10/24, 41.7%), the second is that the sowing is complicate by planting a refuge (10/24, 41.7%). All individual reasons for not planting a refuge are listed in Appendix A, Table A.17.

Chapter 4

Conclusions

The analysis of 249 questionnaires from a survey of farmers cultivating MON 810 in 2012 in five European countries did not reveal any unexpected adverse effects that could be associated with the genetic modification in MON 810. The sample size was proven to be large enough to significantly reject the hypotheses on adverse effects under the specific 2012 conditions.

The statistically significant effects reported in Part 3 were neither unexpected nor adverse. The corresponding observations mostly correlate to the intended insect protection trait present in MON 810.

This set of data is entered in a database, and complements data collected from the 2006 to 2011 growing seasons. Currently, the database contains data of 1848 valid questionnaires. The survey will be conducted year after year with new entries generated in following season's questionnaires to provide a long term analysis of the effects of cultivation of MON 810 in Europe.

As shown in Tables 4.1 and 4.2 the frequency patterns of farmers' answers in 2012 are similar to those of the previous years. In general the same effects have been observed.

After seven years of farmers surveys no unexpected adverse effects are indicated. Compared to the cultivating practices in conventional maize farmers use nearly the same practices for cultivating MON 810. Because there are no damages of corn borers on the plant, it is healthier overall and therefore it gives more yield.

The data of the influencing factors differ between the years, but the data of the monitoring characters show nearly the same effects every year.

Table 4.1: Overview on the frequency of $Minus^1$ answers of the monitoring characters in 2006 - 2012 in percent [%]

Monitoring characters[1]	2006	2007	2008	2009	2010	2011	2012
Time of planting	1.6	3.4	2.7	2.9	1.8	1.2	0.0
Time of harvest	2.4	3.8	3.4	2.1	2.2	0.4	0.0
Germination vigor	6.0	4.1	1.7	0.8	0.0	0.0	0.4
Time to emergence	6.9	3.1	6.4	5.4	4.1	0.8	0.8
Time to male flowering	0.4	1.7	4.7	2.1	3.7	0.0	0.8
Plant growth and development	6.5	6.9	9.8	5.9	7.0	0.8	1.6
Incidence of stalk / root lodging	58.9	36.2	38.6	31.9	35.1	24.5	28.1
Time to maturity	2.0	4.8	4.3	2.9	4.1	0.0	0.0
Yield	2.4	3.9	4.4	1.7	1.8	0.0	2.4
Occurrence of volunteers	33.9	8.4	11.1	10.8	8.2	6.9	4.2
Disease susceptibility	36.1	21.7	34.7	29.2	25.6	19.7	17.3
Insect pest control (ECB)	0.4	0.0	0.4	0.4	0.4	0.0	0.0
Insect pest control (PB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pest susceptibility	11.1	5.9	18.5	17.2	18.6	17.7	21.3
Weed pressure	0.4	2.1	1.7	2.1	4.8	0.0	0.0
Occurrence of wildlife[4]	2.9	6.1	7.7				
Occurrence of non target insects[2]				0.9	0.8	0.9	0.0
Occurrence of birds[2]				0.4	1.2	0.4	0.0
Occurrence of mammals[2]				0.9	1.1	0.4	0.4

For grey highlighted frequency values the test against the 10% threshold resulted in P values greater than 0.01, so the null hypotheses could not be rejected.

[1] Monitoring characters and their categories are defined in section 2.2.

[2] These characters are surveyed since the 2009 season.

[3] This character is surveyed since the 2008 season.

[4] The question on wildlife was asked until 2008. In 2009 it was split into three questions (non target insects, birds, mammals).

Table 4.2: Overview on the frequency of $Plus^1$ answers of the monitoring characters in 2006 - 2012 in percent [%]

Monitoring characters[1]	2006	2007	2008	2009	2010	2011	2012
Crop rotation[2]				0.8	1.8	0.8	4.4
Time of planting	5.9	3.8	2.7	1.3	4.1	1.6	3.6
Tillage and planting technique	0.0	0.7	0.0	0.4	0.4	0.0	2.0
Insect control practices	48.0	11.9	22.2	18.3	16.26	24.9	17.3
Maize Borer control practice[3]			9.8	22.9	15.5	22.9	18.1
Weed control practices	0.4	0.3	0.3	0.0	0.4	0.0	0.0
Fungal control practices	0.0	1.1	0.3	0.4	0.0	0.0	0.0
Fertilizer application	0.8	0.3	0.0	0.4	0.4	0.0	0.0
Irrigation Practices	1.6	0.0	0.0	0.0	0.4	0.0	0.0
Time of harvest	24.1	18.6	13.8	7.9	6.6	4.4	4.0
Germination vigor	8.0	6.9	11.4	14.6	16.2	5.6	5.6
Time to emergence	5.7	3.8	2.0	0.8	0.4	0.0	0.4
Time to male flowering	1.6	7.7	3.7	1.7	2.6	2.0	1.2
Plant growth and development	1.6	4.8	2.7	2.1	3.7	0.8	2.0
Incidence of stalk / root lodging	1.6	0.3	0.3	0.0	2.2	0.0	0.0
Time to maturity	30.9	25.9	24.0	14.6	16.2	15.9	16.1
Yield	68.7	44.8	52.7	56.9	49.8	43.4	43.0
Occurrence of volunteers	0.0	1.7	0.0	0.0	0.4	0.0	0.0
Disease susceptibility	2.0	1.0	0.7	0.4	0.4	0.0	0.0
Insect pest control (ECB)	96.4	86.3	86.3	93.7	85.6	86.6	91.1
Insect pest control (PB)	91.0	83.9	85.4	99.3	84.5	86.0	90.7
Pest susceptibility	1.2	1.4	0.7	1.3	0.0	0.0	0.4
Weed pressure	0.0	0.3	0.3	0.0	0.4	0.0	0.0
Occurrence of wildlife[4]	2.1	2.9	2.4				
Occurrence of non target insects[2]				0.9	0.4	0.4	0.0
Occurrence of birds[2]				0.0	0.8	0.0	0.0
Occurrence of mammals[2]				1.3	1.1	0.4	0.0
Performance of animals	0.0	6.7	4.9	8.9	12.3	10.5	10.3

For grey highlighted frequency values the test against the 10% threshold resulted in P values greater than 0.01, so the null hypotheses could not be rejected.

[1] Monitoring characters and their categories are defined in section 2.2.

[2] These characters are surveyed since the 2009 season.

[3] This character is surveyed since the 2008 season.

[4] The question on wildlife was asked until 2008. In 2009 it was split into three questions (non target insects, birds, mammals).

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Appendix A

Tables of free entries

Table A.1: Specifications for changed crop rotation before planting MON 810 (Section 3.1)

Country	Quest. Nr.	Crop rotation	Comments
Spain	3792	changed	I sow YieldGard maize in fields where before I have grown conventional maize and after Tomato or Potato.
Spain	3798	changed	I sow YieldGard maize in rotation with Potato and conventional maize in rotation with Cotton.
Spain	3799	changed	I sow YieldGard maize after Potato and conventional in rotation with Maize and Cotton.
Spain	3802	changed	I sow YieldGard maize after Potato.
Spain	3803	changed	I sow YieldGard maize after Potato and conventional in rotation with Maize and Cotton.
Spain	3805	changed	I sow YieldGard after Potato and conventional maize after Cotton.
Spain	3806	changed	I sow YieldGard maize after Potato and conventional after Cotton and Maize.
Spain	3807	changed	I sow YieldGard in fields where I grow maize every season and there are a lot of ECB problems.
Spain	3808	changed	I sow YieldGard maize after Potato, in the time of the ECB attack is bigger.
Czech Republic	3607	changed	GMO maize was sowed on a field with maize as fore crop.
Czech Republic	3623	changed	Major rotation was maize.

Table A.2: Specifications for different planting time of MON 810 (Section 3.1)

Country	Quest. Nr.	Planting time	Comments aggregate	Comments
Spain	3798	later	flexibility	YieldGard has a cycle shorter than conventional maize.
Spain	3799	later	flexibility	YieldGard maize has a cycle shorter than conventional varieties. I sow YieldGard after Potato in the time of ECB attack.
Spain	3802	later	flexibility	YieldGard has a cycle shorter than conventional varieties. I sow YieldGard after Potato.
Spain	3803	later	flexibility	YieldGard maize has a cycle shorter than conventional varieties. I sow YieldGard after Potato in the time of ECB attack.
Spain	3805	later	flexibility	YieldGard has a cycle shorter than conventional varieties. I sow YieldGard after Potato in the time of ECB attack.
Spain	3806	later	flexibility	YieldGard maize has a short cycle, I sow it on the first days of June. I sow conventional maize on the first days of March.
Spain	3808	later	flexibility	YieldGard has a cycle shorter than conventional maize and I sow it on June after Potato harvest.
Czech Republic	3615	later	flexibility	Sowing started with conventional silage hybrids.
Romania	3624	later	flexibility	Was waiting for authorization approval from country level.

Table A.3: Specifications for different tillage and planting technique of MON 810 (Section 3.1)

Country	Quest. Nr.	Tillage and planting technique	Comments aggregate	Comments
Spain	3799	changed	YieldGard soil tillage in spring since I sow it later than conventional maize.	
Spain	3802	changed	YieldGard soil tillage in spring, after Potato harvest. Conventional maize soil tillage in winter.	
Spain	3803	changed	YieldGard soil tillage in spring by lately sowing and conventional soil tillage in winter by early sowing.	

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Country	Quest. Nr.	Tillage and planting technique	Comments aggregate	Comments
Spain	3806	changed	I sow YieldGard like second crop of year and the soil tillage is in spring. Conventional soil tillage is in winter.	
Spain	3808	changed	YieldGard soil tillage in spring, after Potato harvest.	

Table A.4: Insecticides applied in MON 810 (Section 3.1) differentiated by their use

Active	Insecticide as cited by the farmer	Spain	Portugal	Slovakia	Romania	Total
Seed treatment						
Clotianidin	Poncho	126	39	1	0	166
Fipronil	Regent TS	27	0	0	0	27
Thiametoxam	Cruiser	4	10	1	4	19
Imidachloprid	Gaucho	0	0	0	6	6
Total		157	49	2	10	218
Spray						
Abamectin	Apache, Abamectina	32	0	0	0	32
Lambda-Cyhalotrin	Judo, Karate King, Karate Zeon	3	26	0	0	29
Clorpirifos	Chas 48, Clorpirifos 48, Dursban 48, Pyrinex 48, Risban 48 EC	13	1	0	0	14
Deltametrin	Audace, Decis expert, Deltametrin	8	2	0	0	10
Bifentrin	Bandit 10 EC, Estrella 10 EC	2	0	0	0	2
Thiacloprid	Biscaya, Calypso	0	1	0	1	2
´ Metyl-Clorpirifos	Reldan E	1	0	0	0	1
Total		59	30	0	1	90
Granules						
Clorpirifos	Clorpirifos 5G, CHAS 5G, Dursban 5G, Pison, Barsun 5G, Clorifos 5G, Fostan 5G	24	0	0	0	24
Total		24	0	0	0	24

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Active	Insecticide as cited by the farmer	Spain	Portugal	Slovakia	Romania	Total
Total		240	79	2	11	332

Table A.5: Explanations for for changed insect and corn borer control practice in MON 810 (Section 3.1)

Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Spain	3732	yes	different	Insecticide treatment against ECB in conventional maize, it is not necessary in YieldGard maize.	yes	changed	YieldGard does not need to be treated against ECB but conventional maize yes.
Spain	3756	yes	different	I treat conventional maize against ECB but YieldGard not.	yes	changed	Because I need to treat conventional maize against ECB with Clorpirifos and it is not necessary in YieldGard maize.
Spain	3804	yes	different	Conventional maize must be treated against ECB and Red Spider and YieldGard maize not.	yes	changed	YieldGard does not need insecticide treatments against ECB and conventional maize yes.
Spain	3807	yes	different	I treat conventional maize with Clorpirifos against ECB and YieldGard not.	yes	changed	I do not need to treat YieldGard but conventional maize needs one treatment with Clorpirifos against ECB.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3811	yes	similar	no statement	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields, had no need for such procedure.
Portugal	3812	yes	different	Seed treatment with Poncho in GM and conventional maize, in conventional one more insecticide treatment.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields, had no need for such procedure.
Portugal	3813	yes	different	The farmer made one more insecticide treatment in the conventional fields compared with the GM fields.	yes	changed	It wasn´t necessary to apply any treatments for the maize borer in the transgenic (GM) fields of maize.
Portugal	3815	yes	similar	no statement	yes	changed	The farmer didn't make any treatment for the control of maize borer in GM field.
Portugal	3817	yes	different	The farmer made two more insecticide treatment in the conventional fields compared with the GM fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3819	yes	different	The farmer made one more insecticide treatment in the conventional fields compared with the GM fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields because had no need to do such procedure.
Portugal	3824	yes	different	The farmer made two or three more insecticide treatments in the conventional fields compared with the GM fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3825	yes	different	The farmer made two less insecticide treatments in the GM fields compared with the conventional fields	yes	changed	Unlike the conventional maize the farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3826	yes	different	The farmer made two less insecticide treatments in the GM fields compared with the conventional fields.	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM fields, there were no need for such procedure.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3827	yes	different	The farmer had fewer (less) insecticide treatments in the GM fields compared with the conventional fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3828	yes	different	The farmer didn´t apply insecticides treatments practices in the GM maize besides the seed treatment (poncho)	yes	changed	The farmer didn´t apply any kind of treatments for the control of maize borer in the GM fields.
Portugal	3829	yes	different	The farmer made 1 less insecticide treatment in the GM maize.	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3830	yes	different	The farmer made less insecticide treatments, one treatment specifically, in the GM fields compared with the conventional fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields. No need.
Portugal	3831	yes	different	the farmer made just 1 less insecticide treatments in the transgenic maize (GM)	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM maize.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3832	yes	different	The farmer made one less insecticide treatment in the GM maize	yes	changed	The farmer had no need to make any treatments to control the maize borer in the GM fields.
Portugal	3833	yes	different	had fewer (less) insecticide treatments in the GM fields compared with the conventional fields	yes	changed	no need to make any treatments to control the maize borer in the GM fields.
Portugal	3834	yes	different	The farmer made one less insecticide treatments in the GM fields compared with the conventional fields	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3835	yes	different	The farmer made one less insecticide treatments in the GM fields compared with the conventional fields.	yes	changed	No treatments for the control of maize borer.
Portugal	3836	yes	different	in the conventional maize he did one more insecticide treatment.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3837	yes	different	The farmer made less two insecticide treatments in the GM maize	yes	changed	no need to make any treatments to control the maize borer in the GM fields.
Portugal	3838	yes	different	The farmer made one less insecticide treatment in the GM maize	yes	changed	no need and requirement to make any treatments to control the maize borer in the GM fields.
Portugal	3839	yes	different	The farmer made two less insecticide treatments in the GM maize.	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3840	yes	different	The farmer made two less insecticide treatments, per ha, in the GM maize.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM fields.
Portugal	3841	yes	different	The farmer made less insecticide treatments in the GM maize.	yes	changed	The farmer didn´t make any kind treatments for the control of maize borer in the GM fields.
Portugal	3842	yes	different	The farmer made less insecticide treatments in the transgenic maize	yes	changed	The farmer didn´t treat absolutely nothing for the control of maize borer in the GM fields.

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3843	yes	different	The farmer made one or even two less insecticide treatments in the transgenic maize (GM)	yes	changed	he didn´t apply any treatments for the control of maize borer in the GM fields.
Portugal	3844	yes	different	The farmer made at least two less insecticide treatments in the GM dry maize	yes	changed	Simply didn´t need to make any treatments for the control of maize borer in the GM maize fields.
Portugal	3845	yes	different	The farmer made less insecticide treatments in the GM maize fields compared with the conventional maize fields.	yes	changed	The farmer didn´t make any treatments for the control of maize borer in the GM maize fields.
Portugal	3846	yes	different	The farmer made two less insecticide treatments in the GM maize compared with the conventional maize.	yes	changed	Didn´t make any treatments for the control of maize borer in the GM maize fields.
Portugal	3847	yes	different	The farmer made less/fewer insecticide treatments in the GM dry maize	yes	changed	Simply didn´t need to make any treatments for the control of maize borer in the GM maize fields

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Portugal	3848	yes	different	The farmer made two less insecticide treatments, per ha, in the GM maize	yes	changed	Didn´t make any treatments for the control of maize borer in the GM maize fields
Portugal	3849	yes	different	The farmer made a reduction of two insecticide treatments at least in the GM dry maize	yes	changed	the farmer didn´t make any treatments for the control of maize borer in the GM fields
Czech Republic	3607	yes	different	YieldGard was not treated	yes	changed	YieldGard was not treated
Czech Republic	3608	yes	different	no corn borer	yes	changed	no corn borer
Czech Republic	3611	yes	different	no use in YieldGard	yes	changed	no use in YieldGard
Czech Republic	3615	yes	different	no treatment	yes	changed	no treatment
Czech Republic	3618	yes	different	no treatment	yes	changed	no treatment
Czech Republic	3619	yes	different	no treatment	yes	changed	no treatment
Czech Republic	3620	yes	different	no treatment	yes	changed	no treatment

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Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in insect control practice
Czech Republic	3621	yes	different	maize does not need treatment	yes	changed	maize does not need treatment
Czech Republic	3623	yes	different	no treatment	yes	changed	no treatment

Table A.6: Herbicides applied in MON 810 (Section 3.1)

Active	**Herbicides as stated by the farmers**	**Spain**	**Portugal**	**Czech Republic**	**Slovakia**	**Romania**	**Total**
Nicosulfuron	Bandera, Chaman, Elite M, Elite Plus 6 OD, Milagro, Mistral, Nic-4, Sajon, Samson	90	14	3	0	8	115
Acetochlor, Terbuthylazin	Harness GTZ, Lanceiro super, Click Plus, Controler Super	105	0	1	0	0	106
Mesotrion	Callisto	16	22	6	0	6	50
S-Metolachlor, Terbuthylazin	Primextra Liquido Gold Twin, Tyllanex Magnum	17	28	0	0	0	45
Mesotrion, S-Metolachlor	Camix	35	3	0	0	0	38
Acetochlor	Acetocloro 84, Acetopron, Combo, Guardian, Guardian Safe Max, Harness Plus, Nudor Forte	18	0	5	0	7	30
Fluroxypyr	Starane 20, Tomahawk	30	0	0	0	0	30
Mesotrion, S-Metolachlor, Terbuthylazin	Gardoprim Gold Plus, Lumax	0	18	7	0	0	25
Dicamba	Banvel D, Dicamba	21	0	1	0	1	23
Isoxaflutol	Adengo, Merlin, Spade	11	0	8	1	1	21

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Active	Herbicides as stated by the farmers	Spain	Portugal	Czech Republic	Slovakia	Romania	Total
Foramsulfuron, Isoxadifenethyl	Option	0	14	0	0	0	14
Sulcotrion	Mikado, Pentagon, Sudoku, Zeus	5	8	0	0	0	13
Bromoxynil	Bromotril 24 EC, Buctril, Certrol B	10	0	0	0	0	10
Glyphosat	Herbolex, Montana, Piton, Roundup	6	1	1	0	0	8
Aclonifen, Ixosaflutol	Lagon	6	0	0	0	0	6
Dimethenamid-P	Outlook, Spectrum	0	1	6	0	0	7
Nicosulfuron, Terbuthylazin	Nicoter	0	6	0	0	0	6
Flufenacet, Terbuthylazin	Aspect	0	5	0	0	0	5
MCPA	Herbidens, MCPA 40%	5	0	0	0	0	5
Bentazon	Laddok	0	4	0	0	0	4
Isoxadifen, Tembotrion	Laudis	0	3	0	1	0	4
Foramsulfuron	Cubix	3	0	0	0	0	3
Pethoxamid	Successor 600	2	0	1	0	0	3
Terbuthylazin	Click, Cuna, Pasadena	2	0	1	0	0	3
2.4D, Dicamba	Premiant	0	0	0	0	2	2
2.4D, Florasulam	Mustang	2	0	0	0	0	2
Acetochlor, Dichlormid	Trophy 40 SC	1	0	1	0	0	2
Dicamba, Titrosulfron	Arrat	0	0	2	0	0	2

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Active	**Herbicides as stated by the farmers**	**Spain**	**Portugal**	**Czech Repub-lic**	**Slovakia**	**Romania**	**Total**
Foramsulfuron, Idodsulfronmethyl, Isoxadifenethyl	MaisTer	0	0	2	0	0	2
Pethoxamid, Terbuthylazin	Bolton Duo, Koban T	0	0	2	0	0	2
Rimsulfuron	Principal	0	0	0	1	1	2
2.4 D	Dicopur	0	0	0	0	1	1
Acetochlor, Atrazin, Dichlormid	Trophy Super	1	0	0	0	0	1
Acetochlor, Furylazol, Terbuthylazin	Guardian Tetra	0	0	0	1	0	1
Bromoxynil, Terbuthylazin	Duvaster Post	1	0	0	0	0	1
Dimethenamid-P, Pendimethalin	Wing-P	0	0	1	0	0	1
Nicosulfuron, Rimsulfuron	Hector	0	0	1	0	0	1
Rimsulfuron, Thifensulfuron	Grid	0	0	1	0		1
Total		387	127	50	4	27	595

Table A.7: Explanations for different harvest time of MON 810 (Section 3.1)

Country	Quest. Nr.	Harvest	Comments aggregate	Comments
Spain	3792	later	plant development, plant health, stay green effect, maturity (water content)	Because YieldGard has more humidity than conventional maize and it maturates later.
Spain	3799	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	YieldGard is sowed later than conventional maize and also it is harvested later.
Spain	3802	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	YieldGard is sowed later and it is harvested later than conventional maize.
Spain	3803	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	YieldGard is sowed later than conventional maize.
Spain	3805	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	YieldGard is sowed later than conventional maize.
Spain	3806	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	I sow YieldGard in June and I harvest it in December. I sow conventional maize in March and I harvest it in September.
Spain	3808	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	YieldGard is sowed later (short cycle) than conventional maize (long cycle).
Czech Republic	3614	later	plant development, plant health, stay green effect, maturity (water content)	Healthy plants - a longer vegetation period.
Czech Republic	3615	later	desired flexibility (cropping system, logistics, channeling/ coexistence)	The maize was harvested as CCM.
Romania	3624	later	weather	harvested after conventional because of rain

Table A.8: Explanations for characteristics of MON 810 different from "as usual" (Section 3.2)

Country	**Quest. Nr.**	**Germi-nation**	**Emer-gence**	**Male flower-ing**	**Plant growth**	**Stalk/-root lodging**	**Maturity**	**Yield**	**Volun-teers**	**Comments**
Spain	3634	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB attacks and it does not fall down, all production is harvested and it gives higher yield than conventional maize.
Spain	3636	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize does not fall down because it is resistant to ECB and all maize ears are harvested. Conventional maize falls down and it has yield losses.
Spain	3637	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard gives higher yield than conventional maize since the plants and the maize ears do not fall down because YieldGard is resistant to ECB attacks.
Spain	3646	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is healthier, without ECB damages and their production is higher than conventional maize yield.
Spain	3647	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has not ECB damage, the maize ear does not fall down, all production is harvested and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3648	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB and the plants and the maize ears do not fall down, all production is harvested and it gives higher yield than conventional maize.
Spain	3650	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard is healthier, it is greener, it delays maturation, it has not ECB damage, there are less volunteers next season and it gives higher yield than conventional maize.
Spain	3651	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard maize without ECB damage, it is greener, it maturates later, the maize ear does not fall down, then there are less volunteers next year, all their production is harvested giving higher yield than conventional maize.
Spain	3657	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard maturates later since it is healthier, without ECB damage and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3659	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard maize is healthier, without ECB damage, it maturates a few later and their production is higher than conventional maize.
Spain	3664	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall down since it is resistant to ECB attacks, all maize ears are harvested and then it gives higher yield than conventional maize with ECB damage.
Spain	3665	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard gives higher yield than conventional maize since it has not ECB damage, it is healthier, the plants and the maize ears do not fall down and all their production is harvested.
Spain	3666	as usual	as usual	as usual	as usual	less often	as usual	as usual	as usual	YieldGard maize does not fall down since it has not ECB attack. Conventional maize has ECB damage and it falls down.
Spain	3667	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3670	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize has not ECB attack and it does not fall down, all their production is harvested and it gives more kilos of production than conventional maize.
Spain	3677	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard produces higher yield than conventional maize since it has not ECB damage and the plants and the maize ears do not down.
Spain	3681	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize is resistant to ECB and it does not fall down, it gives higher yield than conventional maize since it has not yield losses.
Spain	3682	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives higher yield than conventional maize since it has not ECB damage.
Spain	3683	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has not ECB damage, the plants and the maize ears do not fall down and it produces 1.500 kg/ha more than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3684	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize has not ECB damage and then it does not fall down, it has not yield losses and it produces higher yield than conventional maize.
Spain	3685	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize is healthier, without ECB damage, it does not fall down and it gives higher yield than conventional maize.
Spain	3688	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB and the maize ears do not fall down, all production is harvested and it gives higher yield than conventional maize.
Spain	3690	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard produces 20% more than conventional maize yield because it has not yield losses by ECB damage and it does not fall down.
Spain	3691	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize is resistant to ECB, then it does not fall down and all production is harvested giving higher yield than conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3692	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, without ECB damage, it does not fall down, all yield is harvested giving higher production than conventional maize.
Spain	3694	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB attack, it has not damages, the plants and the maize ears do not fall down, all production is harvested giving higher yield than conventional maize.
Spain	3696	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard has not ECB damage and it gives higher yield than conventional maize.
Spain	3697	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard does not fall down since it has not ECB damage, it is healthier and it maturates later, giving higher yield than conventional maize.
Spain	3698	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard is healthier, it is greener, it maturates later, it does not fall down since it has not ECB damage, then it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3700	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB, it does not fall down and it gives higher yield than conventional maize.
Spain	3701	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize is healthier, without ECB damage, it does not fall down, then all production is harvested giving higher yield than conventional maize.
Spain	3705	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard does not fall down since it has not ECB attack, it is healthier and it maturates later giving higher yield than conventional maize.
Spain	3706	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard without ECB damage, it is greener, it is healthier, it maturates a few later, it does not fall down and it produces 20% more than conventional maize yield.
Spain	3707	as usual	as usual	as usual	as usual	as usual	as usual	lower yield	as usual	When there is not ECB attack, the YieldGard varieties that I growing are less productive than the conventional varieties planted in my farm.

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Country	**Quest. Nr.**	**Germi-nation**	**Emer-gence**	**Male flower-ing**	**Plant growth**	**Stalk/-root lodging**	**Maturity**	**Yield**	**Volun-teers**	**Comments**
Spain	3712	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard has not ECB damage, it is healthier, it is does not fall down, it matu-rates a few later, the YieldGard grain has more humidity and it gives higher yield than conventional maize.
Spain	3732	as usual	as usual	as usual	as usual	less often	as usual	as usual	as usual	YieldGard is resistant to ECB and it does not fall down. Conventional maize falls down.
Spain	3733	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives higher yield than con-ventional maize when there is ECB at-tack and too the years that there is not ECB attack.
Spain	3735	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard without ECB damage, then the plants and the maize ears do not fall down giving higher yield than conven-tional maize.
Spain	3737	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard gives 10% more of yield than conventional maize since it has not ECB damage and it does not fall down.
Spain	3738	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard healthier, without ECB dam-age, it does not fall down and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3739	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall down since it has not ECB damage, all production is harvested without yield losses, giving more production than conventional maize.
Spain	3740	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard produces more than conventional maize, it maturates a few later since is greener, healthier, without ECB damage.
Spain	3748	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard is greener, their grains have more humidity, it maturates later than conventional maize.
Spain	3749	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard maturates a few later than conventional maize since it is greener, with one degree more of humidity.
Spain	3753	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard is healthier, it is greener, it maturates later than conventional maize since it has two degrees of humidity more.
Spain	3754	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard delays maturation since the plant is healthier, greener, with one or two degrees of humidity more than conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3756	as usual	as usual	delayed	as usual	less often	as usual	higher yield	as usual	YieldGard flowers one week later, it is healthier, it is resistant to ECB, it does not fall down and it is more productive than conventional maize.
Spain	3757	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard has more humidity than conventional maize and it needs one week more to maturate and dry.
Spain	3762	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is resistant to ECB, it is healthier, it does not fall down, there are not volunteers next season, it maturates later and it produces more than conventional maize.
Spain	3764	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard is healthier, it is greener, it maturates 15 days later than conventional maize.
Spain	3766	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard has not ECB damage, there are not volunteers in the fields next year since it does not fall down and it produces 300 kg/ha more than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3767	as usual	delayed	delayed	delayed	as usual	delayed	lower yield	as usual	YieldGard delays emergence, flowering and maturation but it produces less yield than conventional maize (200 kg/ha less of less of yield).
Spain	3768	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is healthier and it gives a few more yield than conventional maize.
Spain	3771	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard does not fall down since it has not ECB damage, it is healthier, it is greener and it maturates later giving higher yield than conventional maize.
Spain	3772	less vigorous	as usual	as usual	delayed	as usual	as usual	lower yield	as usual	YieldGard is less vigorous in germination, their development is slower and their production is lower than conventional maize.
Spain	3773	as usual	as usual	as usual	as usual	as usual	as usual	lower yield	as usual	YieldGard is planted in less fertile soils than conventional maize fields and then it gives less production.
Spain	3776	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard maize is healthier without ECB damage, it does not fall down, it maturates later and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3778	more vigorous	accelerated	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard is resistant to ECB, it is more vigorous, it emerges before, it does not fall down, it is greener and maturates later giving higher yield than conventional maize.
Spain	3779	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard without ECB damage, it does not fall down, it has more humidity and it maturates a few later, all production is harvested and it produces more than conventional maize.
Spain	3781	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard maize has not ECB damage, it does not fall down and there are not volunteers next season, it has more humidity and it maturates later, it produces more than conventional maize.
Spain	3782	as usual	as usual	as usual	delayed	less often	delayed	lower yield	as usual	YieldGard development is delayed, it maturates later, it does not fall down but it is less productive than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3783	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard maize has not ECB damage, it is healthier and greener, it delays maturation and it gives higher yield than conventional maize.
Spain	3784	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is resistant to ECB, without damage, it produces more than conventional maize.
Spain	3786	as usual	as usual	as usual	accelerated	less often	as usual	higher yield	as usual	YieldGard is healthier, it grows more quickly, it does not fall down and all yield is harvested, it produces more than conventional maize.
Spain	3787	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is more productive than conventional maize including years with a weak ECB attack like this season.
Spain	3788	more vigorous	as usual	as usual	accelerated	less often	as usual	higher yield	less often	YieldGard is more vigorous, it grows more quickly, it has not ECB damage and then it does not fall down, there are not volunteers next season, all production is harvested and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3789	more vigorous	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is more vigorous in germination, it does not fall down since it is resistant to ECB, there are less volunteers next ear and it gives higher yield than conventional maize.
Spain	3790	as usual	as usual	as usual	as usual	less often	delayed	as usual	as usual	YieldGard it does not fall down, it is greener with more humidity and it maturates one week later than conventional maize.
Spain	3791	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is more productive since it has not yield losses secondary to ECB attack and conventional maize has ECB yield losses.
Spain	3792	as usual	as usual	accelerated	as usual	less often	delayed	higher yield	as usual	YieldGard flowers before, it is healthier, it maturates later, it does not fall down since it has not ECB damage and it gives higher yield than conventional maize.
Spain	3793	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	less often	YieldGard has not ECB damage, it has more humidity and it maturates later, there are less volunteers in the field next year and and it gives higher yield than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3794	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard without ECB damage, it is healthier and more productive than conventional maize.
Spain	3795	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall down since it has not ECB attack, all production is harvested and it produces more than conventional maize.
Spain	3796	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard maize is resistant to ECB, it does not fall down and it produces more than conventional maize.
Spain	3797	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is healthier, it is greener, it has more humidity, it has not ECB damage, it produces more than conventional maize.
Spain	3799	as usual	as usual	as usual	as usual	less often	delayed	as usual	less often	YieldGard does not fall down then there are less volunteers next year in the field, it needs more time to get maturity since it has more humidity and the years with a weak ECB attack it gives the same production than conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Spain	3800	as usual	accelerated	accelerated	accelerated	less often	delayed	higher yield	as usual	YieldGard emerges and flowers before, it grows more quickly, it is greener with two degrees more of humidity, it maturates later, without ECB damage, it does not fall down and it produces 2.500 kg/ha more than conventional maize.
Spain	3801	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB attack, it does not fall down, all production is harvested giving more kilos of yield than conventional maize.
Spain	3803	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard maize is healthier, without ECB damage, it maturates later, it does not fall down giving higher yield than conventional maize.
Spain	3804	more vigorous	as usual	as usual	accelerated	as usual	as usual	higher yield	as usual	YieldGard is more vigorous in germination, it grows more quickly, it is healthier without ECB damage and it gives higher yield than conventional maize.
Spain	3805	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard without ECB damage, it does not fall down, it is healthier, all production is harvested and it is more productive than conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	3806	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is resistant to ECB, it is healthier, it is greener, it needs one or two weeks more to get maturation, it does not fall down then there are not volunteers next season giving higher yield than conventional maize.
Spain	3807	as usual	as usual	as usual	as usual	less often	delayed	as usual	as usual	YieldGard maize is greener, it has more humidity then it maturates a few later than conventional maize and it does not fall down.
Spain	3808	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has not ECB damage, it does not fall down, all production is harvested and it gives higher yield than conventional maize.
Portugal	3809	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The field characteristics are entirely the same between the GM maize and the conventional maize. The average yields of the GM maize, (forage maize) were similar compared with the conventional maize, about 72000 kg/ha.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Portugal	3810	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of the GM maize, (forage maize) were similar compared with the conventional maize, about 62500 kg/ha.
Portugal	3811	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All features were identical. The average yields of the GM maize, (forage maize) were similar compared with the conventional maize, about 55000 kg/ha.
Portugal	3812	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of the GM maize, (dry maize) were similar compared with the conventional maize, about 12700 kg/ha. All other features were also similar.
Portugal	3813	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of 12600 kg/ha in the transgenic (GM) maize, dry maize, were similar compared with the conventional maize. All other features were also similar.
Portugal	3814	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All features were similar and identical like the average yields of the GM maize, (dry maize) were similar compared with the conventional maize, about 10000 kg/ha.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3815	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	Excellent vigor/force and strength of GM maize. The excellent average yields of 16000 kg/ha in the transgenic (GM) maize, dry maize.
Portugal	3816	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	An average of 500 kg/ha higher compared with conventional maize. The average yields of 13500 kg/ha in the transgenic maize (GM), dry maize. The quality of GM maize grain is substantially better.
Portugal	3817	more vigorous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The GM plant is vigorous stronger, the ear had a better sanity and with a strong stem. An average of 1000 kg/ha higher in GM maize yields, dry maize, compared with conventional maize. The average yields of 13125 kg/ha in the transgenic maize (GM), dry maize.
Portugal	3818	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All the features were completely normal. The average yields of 12 000 kg/ha in the transgenic (GM) maize, dry maize, were similar compared with the conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Portugal	3819	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of 12000 kg/ha in the transgenic (GM) maize, dry maize, were similar compared with the conventional maize and all the others characteristics were also completely normal without nothing to report.
Portugal	3820	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	An average of 1000 kg/ha higher in GM maize yields, dry maize, compared with conventional maize. The average yields of 14000 kg/ha in the transgenic maize (GM), dry maize. All the other features were entirely normal.
Portugal	3821	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The increase of production was a good advantage of GM maize. An average of 750-1000 kg/ha higher in GM maize yields, dry maize, compared with conventional maize with average yields of 13750 kg/ha in the transgenic maize (GM), dry maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3822	more vigorous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The average yields of 13800 kg/ha in the transgenic maize (GM), dry maize, were 500 kg/ha higher in GM maize yields compared with the 13300 kg/ha in the conventional maize. Greater germination vigor and better sanity of GM plants.
Portugal	3823	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All the features were completely normal. For example the average yields of 12000 kg/ha in the transgenic (GM) maize, dry maize, were similar compared with the conventional maize. No difference.
Portugal	3824	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of 12500 kg/ha in the transgenic (GM) maize, dry maize, were similar compared with the conventional maize. Greater germination vigor of GM plants and their best sanity were important characters of GM maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3825	more vigorous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The average yields of 13000 kg/ha in the transgenic maize (GM), dry maize, were more than 2000 kg/ha higher in GM maize yields compared with the 10500-11000 kg/ha in the conventional maize. Amazing increase of production with the GM maize but the environmental factors like soils,plots and varieties affected also the productivity. Greater germination vigor of GM plants.
Portugal	3826	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	Better and huge quality of the GM maize . All the other features were completely normal. For example the average yields of 13250 kg/ha in the transgenic (GM) maize, dry maize, and the average yields of 65000 kg/ha (5 ha) in the transgenic (GM) maize, forage maize, were similar compared with the conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3827	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All the features were completely normal. For example the average yields of 58000-60000 kg/ha in the transgenic (GM) maize, forage maize, were similar compared with the conventional maize.
Portugal	3828	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The average yields of 50000 kg/ha in the GM maize (forage maize) were just similar compared with the conventional maize and and all the others characteristics were also entirely normal without nothing to note.
Portugal	3829	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The vigor, force, strength and sanity of GM maize were quite patent and obvious. The average and good yields of 75000 kg/ha in the GM maize, forage maize, were similar compared with the conventional maize.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Portugal	3830	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All features were entirely normal. For example the average yields of 14500 kg/ha in the GM dry maize and the average yields of 55000 kg/ha in GM forage maize were similar compared with the conventional maize.
Portugal	3831	more vigor-ous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The only and significant difference was not only in the plant vigor but also in the intrinsic quality of the GM maize. The average and quite good yields of 15500 kg/ha in the GM dry maize and the average yields of 30000 kg/ha (bad this year) in the GM forage maize were equal compared with the conventional maize.
Portugal	3832	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All characteristics and features were similar. For example the average yields of 14500 kg/ha in the GM dry maize and the yields of 14500 kg/ha in the GM dry maize and the average yields of 30000 kg/ha in the GM forage maize were equal compared with the conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3833	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	By the farmer´s experience on several years the farmer knows that the vigor, strength and sanity of GM maize were amazing and a great advantage for him. All the others characteristics and features were equal. For example the average yields of 14750 kg/ha in the GM dry maize and the average yields of 60000 kg/ha in the GM forage maize were equal compared with the conventional maize.
Portugal	3834	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The increase of production was a great asset and advantage of GM maize. An average of increase of 800 kg/ha higher in GM dry maize yields compared with the conventional maize with average yields of 14800 kg/ha in the GM dry maize.
Portugal	3835	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All features were completely normal. For example the average yields of 13200 kg/ha in the GM dry maize were similar compared with the conventional maize.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3836	more vigorous	as usual	as usual	as usual	as usual	as usual	as usual	as usual	The only and important difference was in the GM plant vigor and also in the intrinsic and enormous quality of the GM maize. The average 13500 kg/ha in the GM dry maize were similar compared with the conventional maize. Also the others features were similar.
Portugal	3837	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The average yields of 15660 kg/ha in the GM dry maize, an average of 500 kg/ha higher compared with conventional maize. All the others characteristics were quite similar between the GM maize and the conventional maize.
Portugal	3838	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Oscillated campaign by campaign but generally and in that last campaign the farmer could ensure that the average yields of 13000 kg/ha in the GM dry maize, was 400-500 kg/ha higher compared with conventional maize. All the others characteristics were similar.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3839	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The average yields of 13250 kg/ha in the GM dry maize were 300-400 kg/ha higher compared with conventional maize. It changed and oscillated year by year but in that last campaign it happened.
Portugal	3840	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The increase of production was an advantage of GM maize in the last campaign. This campaign he had an average of increase of 1000 kg/ha higher in GM dry maize yields compared with the conventional maize. This campaign had very good average yields of 15520 kg/ha in the GM dry maize.
Portugal	3841	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	All features were completely normal. For example the average yields of 14680 kg/ha in the GM dry maize were similar compared with the conventional maize. Nothing to report about differences in agronomic behavior.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Portugal	3842	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Did not always occur in all parcels and not in all the last campaigns but in that last campaign the farmer could report that the the average yields of 13270 kg/ha in the GM dry maize, was 300 kg/ha higher compared with conventional maize. All the others characteristics were similar.
Portugal	3843	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Overall yields increased in the GM maize. The average yields of 12270 kg/ha in the GM dry maize, an average of 500-600 kg/ha higher compared with conventional maize.
Portugal	3844	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Amazing average yields of 16050 kg/ha in the GM dry maize. An average in-creased of 500 kg/ha higher compared with conventional maize. No differences in the others characteristics and agro-nomic behavior.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Portugal	3845	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Overall yields increased in the GM maize was a great advantage. The average yields of 14500 kg/ha in the GM dry maize, an average of 400-500 kg/ha higher compared with conventional maize. All the others characteristics and agronomic behavior were completely equal.
Portugal	3846	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The average yields of 15 570 kg/ha in the GM dry maize, was an average of 500 kg/ha higher compared with conventional maize. The others field characteristics and agronomic behavior were equal between the GM and the conventional maize.
Portugal	3847	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	Excellent and amazing average yields of 17 160 kg/ha in the GM dry maize. But by the farmer´s experience all features were completely normal with nothing to mention about differences in agronomic behavior.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Portugal	3848	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Didn´t happen in all plots but in that last campaign the farmer could report that the average yields of 12840 kg/ha in the GM dry maize, was 500-600 kg/ha higher compared with conventional maize. All the others characteristics were normally similar.
Portugal	3849	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Spectacular increase of production with the GM dry maize in that last campaign. The average yields of 14000 kg/ha in the GM dry maize were 1900-2000 kg/ha higher in GM maize yields compared with the average yields of 12100 kg/ha in the conventional maize.
Czech Republic	3604	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	The occurrence of root lodging was less frequent because the vegetation was healthy. Yield was higher because the maize is healthier.
Czech Republic	3606	as usual	as usual	as usual	as usual	as usual	as usual	as usual	as usual	Volunteers were not observed.

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Country	Quest. Nr.	Germination	Emergence	Male flowering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volunteers	Comments
Czech Republic	3607	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	no statement	The plants are healthy.
Czech Republic	3608	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	no statement	The plants were healthy, not damaged by the corn borer.
Czech Republic	3611	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	no statement	matures later, no damages of corn borer
Czech Republic	3613	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard has higher yield - no damages from the corn borer.
Czech Republic	3614	as usual	as usual	delayed	delayed	less often	delayed	higher yield	as usual	Plants are healthy and free of diseases, therefore plants have a longer vegetation period, mature later and have a higher yield.
Czech Republic	3615	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Yield of YieldGard maize was higher, because the maize was growing on fields with higher soil fertility.
Czech Republic	3617	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The yield is higher because the corn borer does not destroy the maize.

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Country	**Quest. Nr.**	**Germination**	**Emergence**	**Male flowering**	**Plant growth**	**Stalk/-root lodging**	**Maturity**	**Yield**	**Volunteers**	**Comments**
Czech Republic	3618	as usual	as usual	as usual	as usual	less often	delayed	higher yield	no statement	Longer vegetatively active vegetation, healthier
Czech Republic	3619	as usual	as usual	as usual	as usual	less often	delayed	higher yield	no statement	longer vegetatively active vegetation, healthier
Czech Republic	3620	as usual	as usual	as usual	as usual	less often	delayed	higher yield	no statement	longer vegetatively active vegetation, healthier
Czech Republic	3621	as usual	as usual	as usual	as usual	less often	delayed	higher yield	no statement	healthier vegetation, stay green effect
Czech Republic	3622	as usual	as usual	as usual	as usual	as usual	as usual	lower yield	as usual	Our location was affected by two spring frosts - may be the GMO maize has lower resistance to cold.
Slovakia	3601	as usual	as usual	as usual	delayed	less often	delayed	higher yield	as usual	better health condition
Romania	3624	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	higher production due to lack of *Ostrinia* attack, less lodging for the same reason.

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Country	Quest. Nr.	Germi-nation	Emer-gence	Male flower-ing	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Romania	3627	as usual	as usual	as usual	as usual	less often	as usual	higher yield	no state-ment	It is a more sophisticated way to say higher yield and less lodging . (It says that more lodging in conventional corn due to higher pressure of insects and diseases and better quality in MON 810 field).

Table A.9: Additional observation during plant growth (Section 3.2)

Country	Quest. Nr.	Additional observations during plant growth
Spain	3635	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3638	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3640	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3644	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3669	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3672	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3673	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3675	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3676	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3678	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3680	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3686	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3695	YieldGard is harvested with one degree of humidity more than conventional maize.
Spain	3699	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3703	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3722	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3723	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3724	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3726	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.

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Country	Quest. Nr.	Additional observations during plant growth
Spain	3727	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3732	When there is not ECB attack, conventional maize is more productive than YieldGard maize.
Spain	3754	This year there was not ECB attack and there are not differences of production and stalk/root lodging between YieldGard and conventional maize.
Spain	3755	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3756	YieldGard has not *Mythimna* and *Heliothis* attack.
Spain	3761	When there are not ECB attacks, there are not differences between YieldGard and conventional maize.
Spain	3774	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3777	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3780	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3790	This year there was a weak ECB attack and there are not differences between YieldGard and conventional maize yield.
Spain	3792	This year there was a weak ECB attack and the difference of yield between YieldGard and conventional maize is very small.
Spain	3801	In lately sowing of maize only is possible to plant YieldGard since is the moment when ECB attacks.
Spain	3802	There was not ECB attack this year and then there were not differences between YieldGard and conventional maize.
Spain	3807	This year there was not ECB attack and there are not differences of yield between YieldGard and conventional maize.
Spain	3808	This year there was not ECB attack and there are not differences of yield between YieldGard and conventional maize.
Romania	3626	Corn MON 810 supported better hard weather conditions and higher pressure of insects , having a higher yield and superior quality.
Romania	3627	had better growth vegetation in thermic stress during the vegetation

Table A.10: Additional comments on disease susceptibility (Section 3.3)

Country	Quest. Nr.	Disease susceptibility	Comments
Portugal	3809	as usual	The region had a very low incidence of diseases. So it was very difficult for the farmer to record assessments on disease susceptibility.
Portugal	3811	as usual	The farmer didn´t verify any differences on diseases susceptibility between the GM maize and the conventional maize.
Portugal	3812	as usual	The diseases began to appear in their region of production but the farmer didn´t verify any differences on diseases susceptibility between the GM maize and the conventional maize.
Portugal	3813	as usual	This 2012 campaign the diseases (primarily the *Ustilago Maydis*) began to appear in their region of production but the farmer didn´t note any differences on diseases susceptibility.
Portugal	3815	as usual	Nothing to reported, the region of production had a low incidence of diseases it was quite difficult to record assessments on disease susceptibility.
Portugal	3816	as usual	This 2012 campaign the disease *Ustilago Maydis* began to appear in their region of production but the farmer didn´t note any differences on diseases susceptibility. Normal susceptibility.
Portugal	3823	as usual	It was quite difficult for the farmer to recorded assessments on disease susceptibility because the region of production had a very low incidence of diseases.
Portugal	3833	as usual	It was impossible for the farmer to recorded assessments on disease susceptibility because the region had a very low incidence of diseases.
Portugal	3834	as usual	Nothing to recorded, the region of production had a low incidence of diseases it was very difficult to record assessments on disease susceptibility.
Portugal	3835	as usual	Nothing to signalized on diseases susceptibility.
Portugal	3837	as usual	Nothing to distinguished on diseases susceptibility between the GM maize and the conventional one.
Portugal	3840	as usual	It was difficult for the farmer to record assessments on disease susceptibility.
Portugal	3847	as usual	The farmer didn´t verify any differences on diseases susceptibility between the GM maize and the conventional maize.

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Country	Quest. Nr.	Disease susceptibility	Comments
Spain	3667	less susceptible	YieldGard healthier, without ECB wounds, the entry door of *Fusarium* penetration.
Spain	3688	less susceptible	YieldGard healthier, without ECB damages, it has less *Fusarium* problems than conventional maize. ECB damages in the conventional maize ears help the *Fusarium* attack to the grains.
Spain	3691	less susceptible	YieldGard healthier than conventional maize and it resists better the fungus and virus attacks. YieldGard has not wounds from ECB attack then it is more difficult that YieldGard would have *Fusarium* and Virus problems.
Spain	3705	less susceptible	YieldGard maize is healthier, without ECB wounds, the entry door of fungus. YieldGard maize grains healthier, without ECB and *Fusarium* damages. In the conventional maize grains there are first ECB damages and after *Fusarium* damages.
Spain	3782	less susceptible	YieldGard maize always is less affected by *Fusarium* and *Ustilago* than conventional maize. YieldGard is less susceptible to fungal diseases like *Fusarium* and *Ustilago* since it is healthier, without ECB wounds.
Spain	3788	less susceptible	YieldGard is healthier and it has less *Ustilago* attack than conventional maize. YieldGard maize has not ECB wounds and it has not *Ustilago* attack. Conventional maize has *Ustilago* attack.
Spain	3800	less susceptible	YieldGard maize has not ECB wounds and the fungus can not penetrate into the plant. YieldGard has not *Ustilago* and *Fusarium* problems and conventional maize yes.
Spain	3804	less susceptible	YieldGard healthier, without ECB wounds, the entry door for fungus. YieldGard has not *Fusarium* problems but conventional maize yes.
Spain	3807	less susceptible	YieldGard is healthier and it has less diseases problem than conventional maize. YieldGard has less *Fusarium* problems than conventional maize.
Portugal	3814	less susceptible	The farmer noted a little less susceptibility of the GM maize in 2012 campaign mainly in the *Ustilago Maydis* that began to appear in their region of production.

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Country	Quest. Nr.	Disease susceptibility	Comments
Portugal	3817	less susceptible	The farmer verified a less susceptibility of the GM maize in this campaign mainly in the *Ustilago Maydis* that began to appear in their region of production.
Portugal	3820	less susceptible	There were less entry points for diseases in the GM plants (Fewer gateways - Input ports). The sanity of the GM plants were completely amazing.
Portugal	3821	less susceptible	The GM plants were more resistant to the attack of the different other diseases (*Cefalosporium* spp.). The health and sanity of GM maize is higher and makes GM plants entirely more resistant to the attack by the different diseases.
Portugal	3822	less susceptible	The farmer verified a less susceptibility on diseases of the GM maize in this campaign mainly in the *Erwinia zeae* despite the region had a very low incidence of diseases.
Portugal	3824	less susceptible	The huge and largest sanity of GM maize made GM plants more resistant to the diseases (less susceptible to diseases) and were quite important because there were a huge presence in the production region of *Helminthosporium* and other diseases.
Portugal	3825	less susceptible	The enormous sanity of GM maize made GM plants more resistant to the diseases (less susceptible to diseases). It was also important because of the huge presence in the region of production of *Helminthosporium* and other diseases.
Portugal	3826	less susceptible	The GM plants were less vulnerable and more resistant to the attack of the different other diseases.
Portugal	3827	less susceptible	The immense sanity and health of GM maize was a major attraction for the farmer.
Portugal	3828	less susceptible	The farmer noted a less susceptibility on diseases of the GM maize in this campaign mainly in the *Helminthosporium* and *Ustilago maydis* probably because the greater sanity of the GM plant compared with the conventional one.
Portugal	3829	less susceptible	The larger and bigger sanity of GM maize was the great advantage and the superior asset for the farmer compared with the conventional maize.
Portugal	3830	less susceptible	The production safety that the GM maize gave to the farmer and the amazing sanity of GM maize makes GM plants more resistant to the attack by the different diseases.

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Country	Quest. Nr.	Disease susceptibility	Comments
Portugal	3842	less susceptible	The farmer noted a less susceptibility on diseases of the GM maize in this campaign mainly in the *Cefalosporium* spp. because of the higher sanity of the GM plant compared with the conventional one.
Portugal	3843	less susceptible	The larger and major sanity of GM maize made GM plants quiet more resistant to the attack by the different diseases like *Cefalosporium* spp.
Portugal	3844	less susceptible	Another big advantage of the GM maize was the superior sanity of the GM maize.
Portugal	3848	less susceptible	The amazing sanity of GM maize and the production safety that the GM dry maize gave to the farmer were determinant and made GM plants more resistant to the attack by the different diseases.
Portugal	3849	less susceptible	The sanity of GM dry maize made all the differences on diseases susceptibility.
Czech Republic	3607	less susceptible	*Fusarium* spp. is in a high correlation with the occurrence of the corn borer.
Czech Republic	3618	less susceptible	Generally less sensitive. There are no damages of corn borer (entrance of infection).
Czech Republic	3619	less susceptible	Generally less sensitive. There are no damages of corn borer (entrance for infection).
Czech Republic	3620	less susceptible	There are no damages of corn borer - no entrance for infection. Generally less sensitive.
Czech Republic	3621	less susceptible	Generally healthy vegetation without entrance for infection.
Romania	3626	less susceptible	We know the fact that in case of *Ostrinia* attack some diseases are better developing. Having protection against this insect the the degree of attack of the main diseases (*Fusarium* , *Giberella*) it was dramatically reduced.
Romania	3627	less susceptible	Less insect pressure, less diseases in YieldGard field

Table A.11: Additional comments on insect pest control (Section 3.4)

Country	Quest. Nr.	*Ostrinia nubilalis*	*Sesamia* spp.	Comments
Portugal	3814	very good	very good	Fantastic and total control.
Portugal	3815	very good	very good	Exceptional control of maize borer in GM fields.
Portugal	3816	very good	very good	Fantastic effectiveness in the control of maize borer in GM fields.
Portugal	3831	very good	very good	It was a great advantage of the GM maize compared with the conventional one.
Portugal	3832	very good	very good	It was truly remarkable the borer control made by the GM maize.
Portugal	3833	very good	very good	It was undeniable the totally borer control made by the GM maize.
Portugal	3835	very good	very good	Nothing to added about the borer pest control in GM maize.
Portugal	3839	very good	very good	It was a full and intense effectiveness on the control of maize borer in GM fields.
Portugal	3845	very good	very good	Fantastic effectiveness in the control of maize borer in the GM fields was a huge advantage for the farmer.

Table A.12: Additional comments on pest susceptibility (Section 3.5)

Country	**Quest. Nr.**	**Pest susceptibility**	**Order of insect pest**	**Comments**
Spain	3772	more susceptible	Red Spider	YieldGard has more Red Spider damages than conventional maize.
Spain	3684	less susceptible	*Mythimna* spp.	YieldGard is healthier and it is less susceptible to *Mythimna* attack.
Spain	3691	less susceptible	Red Spider	YieldGard is healthier and it has less Red Spider attack than conventional maize.
Spain	3732	less susceptible	*Mythimna* spp.	There is less *Mythimna* presence in YieldGard than in conventional maize.
Spain	3737	less susceptible	*Mythimna* spp.	YieldGard has less *Mythimna* attack than conventional maize.
Spain	3748	less susceptible	*Mythimna* spp.	There are less *Mythimna* damages in YieldGard than in conventional maize.
Spain	3756	less susceptible	*Mythimna* spp., *Heliotis zea*	YieldGard has not *Mythimna* and *Heliotis* damages and conventional maize yes.
Spain	3771	less susceptible	Aphids	Conventional maize has Aphids attack and YieldGard maize not.
Spain	3786	less susceptible	*Spodoptera exigua*	YieldGard is healthier, without ECB damages and it has less *Spodoptera exigua* attack than Conventional maize.
Spain	3788	less susceptible	Mosquito	YieldGard is healthier, without ECB damages and it has less Mosquito attack than conventional maize.
Spain	3793	less susceptible	*Spodoptera exigua*	YieldGard has not *Spodoptera exigua* attack but conventional maize yes.

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Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments
Spain	3804	less susceptible	Red Spider	YieldGard does not need insecticide treatments against ECB and then the beneficial insects controlling Red Spider are respected.
Portugal	3809	less susceptible	*Agrotis* spp.	Despite the region of production had a lower incidence of pests attacks however the GM plants were naturally more protected against the attack of other pests. It was very difficult for the farmer to record and analyse differences in susceptibility.
Portugal	3810	less susceptible	*Agrotis* spp.	The GM plants were naturally more protected against the attack of other pests. Although the region of production had a small incidence of pests attack.
Portugal	3811	less susceptible	*Agrotis* spp.	The farmer verified that the GM plants were naturally more protected against the attack of other pests despite the region of production had a lower incidence of pests attack.
Portugal	3812	less susceptible	*Spodoptera* spp., *Agrotis* spp.	The GM plants were a little more resistant against the attack of other pests despite the region had lower incidence of pests attack.
Portugal	3813	less susceptible	*Agrotis* spp., *Spodoptera* spp.	The GM plants were indirectly more protected against the attack of other pests because the GM maize almost total controlled the different attacks of maize borer.
Portugal	3814	less susceptible	*Agrotis* spp.	The GM plants were indirectly more protected against the attack of other pests.
Portugal	3815	less susceptible	*Agrotis* spp.	By the farmer´s experience the GM maize was indirectly more resistant to the attack of the different other pests (less susceptible to other pests).
Portugal	3816	less susceptible	*Agrotis* spp.	The plots of GM maize were also attacked by other pests but the GM maize was more resistant to the attack of the different other pests (less susceptible to other pests).
Portugal	3817	less susceptible	*Agrotis* spp.	The plots of GM maize were also attacked by other pests (*Agrotis ipsilon*) but the GM maize was more resistant to the attack of the different other pests.

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Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments
Portugal	3819	less susceptible	*Agrotis* spp.	The farmer verified that the GM plants were better protected against the attack of other pests.
Portugal	3820	less susceptible	*Agrotis* spp., *Diabrotica* spp.	There were less "entry points" for infections in the GM plants so the GM maize was more resistant to the attack of the different other pests (less susceptible to other pests).
Portugal	3821	less susceptible	*Agrotis* spp.	Although the GM event was specific for the maize borer the reality was that the GM plant was more indirectly resistant to the attack of the different other pests (less susceptible to other pests).
Portugal	3822	less susceptible	*Agrotis* spp., *Tetranychus* spp.	Was undeniable that the best health and sanity of GM maize made GM plants natural less susceptible to other pests.
Portugal	3823	less susceptible	*Agrotis* spp.	Despite the region of production had a lower incidence of pests attack the GM maize was more resistant to the attack of the different other pests. The plots of GM maize were also attacked by other pests (*Agrotis ipsilon*) but the GM maize was more resistant to the attack. The stronger sanity of GM maize made GM plants natural less susceptible to other pests.
Portugal	3824	less susceptible	*Agrotis* spp., *Tetranychus* spp.	The farmer noted that the GM plants were better protected and resisted against the attack of other pests. The enormous sanity of GM maize makes GM plants more resistant to the attack by the different other pests, was clearly evident in the fields.
Portugal	3825	less susceptible	*Agrotis* spp., *Tetranychus* spp.	Was evident and clearly visible in the fields that the GM plants were naturally more protected against the attack of other pests.
Portugal	38*Spodoptera exigua*	less susceptible	*Agrotis* spp., *Tetranychus* spp.	Although the GM event was specific for the maize borer and not for other pests, the reality was that the GM plant was less susceptible from the attacks of other pests.

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Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments
Portugal	3829	less susceptible	*Tetranychus* spp.	The same reason applied for the diseases was applicable to the other pests. In other words the superior health and sanity of GM maize made GM plants natural less susceptible to other pests.
Portugal	3831	less susceptible	*Agrotis* spp.	The farmer had no doubts that was clearly visible in the fields that the GM plants were naturally more protected against the attack of other pests.
Portugal	3832	less susceptible	*Agrotis* spp.	Although the GM event was not specific for the control of other pests, the reality was that the GM plant was more resistant from the attacks of other pests.
Portugal	3833	less susceptible	*Agrotis* spp.	It was also evident and undeniable the fact that the GM plant was more resistant from the attacks of other pests.
Portugal	3834	less susceptible	*Agrotis* spp., *Diabrotica* spp.	The farmer knows that the GM plants were largest protected and resisted against the attack of other pests because of the huge sanity of GM maize made GM plants more resistant to the attack by the different other pests.
Portugal	3835	less susceptible	*Agrotis* spp., *Diabrotica* spp.	The GM maize was more resistant to the attack of the different other pests. The plots of GM maize were also attacked by other pests (*Agrotis ipsilon* and *Diabrotica speciosa*) but the GM maize was more resistant to the attack.
Portugal	3837	less susceptible	*Agrotis* spp., *Spodoptera* spp., *Tetranychus* spp.	The plots of GM maize were also attacked by other pests but the GM maize was more resistant to those attack. It was evident and real that the fact of GM maize almost total controlled the different attacks of maize borer made GM plants naturally more protected against the attack of other pests.
Portugal	3838	less susceptible	*Agrotis* spp., *Tetranychus* spp., *Spodoptera* spp.	The farmer had no doubts that was clearly evident in the fields that the GM plants were naturally more protected (less susceptible) against the attack of other pests.

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Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments
Portugal	3839	less susceptible	*Agrotis* spp., *Spodoptera* spp., *Tetranychus* spp.	The plots of GM maize were also attacked by other pests like *Agrotis ipsilon*, *Spodoptera* and *Tetranychus* but the GM maize was more resistant to the attack of the different other pests.
Portugal	3840	less susceptible	*Spodoptera* spp.	The GM maize was with no doubts more resistant to the attack of the different other pests like *Spodoptera frugiperda*.
Portugal	3841	less susceptible	*Agrotis* spp., *Spodoptera* spp.	Although the GM event was not specific for the control of other pests, the reality in the fields was that the GM plant was more resistant to the attacks of other pests. The plots of GM maize were also attacked by other pests like *Agrotis ipsilon* and *Spodoptera frugiperda* but the GM maize was more resistant to the attack of the different other pests.
Portugal	3842	less susceptible	*Tetranychus* spp., *Agrotis* spp.	The higher and huge sanity of GM maize made GM plants more resistant to the attack by the different other pests like *Tetranychus urticae* and *Agrotis ipsilon*.
Portugal	3843	less susceptible	*Agrotis* spp., *Tetranychus* spp.	Also on the other pest susceptibility was applied the same reason applied for the diseases. In other words the biggest and largest sanity of GM maize made GM plants natural less susceptible to other pests.
Portugal	3844	less susceptible	*Agrotis* spp., *Tetranychus* spp.	The plots of GM maize were also attacked by other pests like *Agrotis ipsilon* and *Tetranychus urticae* but was clearly and remarkable that the GM maize was more resistant to the attack of the different other pests.
Portugal	3845	less susceptible	*Agrotis* spp.	The GM maize was more resistant to the attack of the different other pests like *Agrotis ipsilon*. Despite the plots of GM maize were also attacked by other pests in effect the GM maize was more resistant to the attack.

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Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments
Portugal	3846	less susceptible	*Agrotis* spp., *Spodoptera* spp., *Tetranychus* spp.	Despite the plots of GM maize were also attacked by other pests like *Agrotis*, *Spodoptera* and *Tetranychus* in effect the GM maize was more resistant from the attack of those other pests compared with the conventional maize.
Portugal	3847	less susceptible	*Agrotis* spp., *Tetranychus* spp.	The plots of GM dry maize were also attacked by other pests and sometimes with intense activity (like *Agrotis ipsilon* and *Tetranychus urticae*) but the reality is that the GM maize was more resistant to the attack of the different other pests.
Portugal	3848	less susceptible	*Spodoptera* spp., *Agrotis* spp.	The enormous sanity of the GM dry maize compared with the conventional one and the determinant fact that the GM maize almost total controls the different attacks of maize borer makes GM plants naturally more protected against the attack of other pests.
Portugal	3849	less susceptible	*Agrotis* spp. , *Spodoptera* spp.	The sanity of GM dry maize was decisive and determinant. Also on the other pest susceptibility was applied the same reason applied for the diseases.
Czech Republic	3604	less susceptible		The maize is less attacked by pests, generally plants are healthier compared to conventional maize.
Czech Republic	3622	less susceptible		Attack of pests was not visible in general.

Table A.13: Weeds that occurred in MON 810 (Section 3.6)

Name of weed	Frequency
Abutilon	106
Sorghum halapense	89
Echinocloa	89
Setaria spp.	67
Chenopodium	63
Amaranthus	51
Datura stramonium	41
Solanum nigrum	25
Cyperus	24
Xanthium	23
Cirsium	15
Portulaca oleracea	11
Polygnonum	10
Agropyron repens	8
Phragmites australis	7
Convolvulus arvense	6
Avena fatua	5
Digitaria sanguinalis	5
Atriplex	2
Cynodon dactylon	2
lucerne volunteers	2
Galium	1
Malva silvestris	1
Matricaria chamomilla	1
Matricaria spp.	1
sunflower volunteers	1
Thlaspi arvense	1
Urtica urens	1

Table A.14: Specifications on the occurrence of mammals (section 3.7)

Country	**Quest. Nr.**	**Occurrence of mammals**	**Specification**
Spain	3688	less	Bigger presence of wild boars in the conventional maize fields since there are maize ears in the soil.

Table A.15: Specifications of the performance of animals fed MON 810 (section 3.8)

Country	Quest. Nr.	Performance of animals	Specification
Czech Republic	3607	different	Lower intake of toxins in the feed.
Czech Republic	3614	different	higher quality of feed
Czech Republic	3617	different	The health of the animals is much better because silage does not contain fungi caused by the corn borer.

Table A.16: Motivations for not complying with the label recommendations (section 4.2)

Country	Quest. Nr.	Compliance	Reasons
Spain	3658	no	I did not have enough time to sow and I planted only 8% of total maize surface like refuge.
Spain	3668	no	I did not plant a refuge because it complicates the sowing.
Spain	3669	no	I did not plant a refuge because it complicates the sowing.
Spain	3670	no	I did not plant a refuge because it complicates the sowing.
Spain	3690	no	Because I did not read the recommendations.
Spain	3692	no	Because I did not read the label recommendations.
Spain	3723	no	I did not plant a refuge in order do not have yield losses by ECB attack.
Spain	3735	no	I did not plant a refuge because it complicates the sowing.
Spain	3740	no	I did not plant a refuge because it complicates the sowing.
Spain	3777	no	I did not plant a refuge because I have small fields and it complicates the sowing.
Spain	3779	no	I did not plant a refuge because I have small fields and it complicates the sowing.
Spain	3786	no	I did not plant a refuge because it complicates the sowing.
Spain	3793	no	I did not plant a refuge because it complicates the sowing.
Spain	3797	no	Because I did not read the label recommendations.
Spain	3798	no	Because I did not read the label recommendations.
Spain	3799	no	Because I did not read the label recommendations.
Spain	3800	no	I do not know the recommendations since I did not read the label.
Spain	3801	no	I did not plant a refuge, I do not know if I have obligation to plant a refuge.
Spain	3804	no	Because I did not read the recommendations.
Spain	3805	no	I did not make attention to the recommendations, I did not understand some recommendations.
Spain	3806	no	I did not plant a refuge because it complicates the sowing.
Spain	3807	no	I do not know the recommendations, I did not read the label.
Spain	3808	no	Because I did not read the label recommendations.

Table A.17: Motivations for not planting a refuge (section 4.3)

Country	Quest. Nr.	Plant refuge?	Reasons
Spain	3670	no	It complicates the sowing.
Spain	3658	no	I did not have enough time to sow and I planted only 8% of total maize surface like refuge and not 20% recommended.
Spain	3668	no	It complicates the sowing.
Spain	3669	no	It complicates the sowing.
Spain	3690	no	Because I did not have information about the technical guidelines.
Spain	3692	no	I have not information about refuge field.
Spain	3723	no	In order do not have yield losses by ECB attack.
Spain	3735	no	It complicates the sowing.
Spain	3740	no	It complicates the sowing.
Spain	3777	no	It complicates the sowing.
Spain	3779	no	It complicates the sowing.
Spain	3786	no	I have small fields and it complicates the sowing.
Spain	3791	no	I have small fields of less of 5 hectares each one and then it is not necessary to plant a refuge.
Spain	3793	no	It complicates the sowing.
Spain	3797	no	I have not information about refuge fields, I do not know the technical guidelines.
Spain	3798	no	I have not information about refuge fields, I do not know the technical guidelines.
Spain	3799	no	I do not know the technical guidelines.
Spain	3800	no	I do not know the technical guidelines, I am not informed.
Spain	3801	no	It is complicate to plant a refuge and ECB attack causes big yield losses in Conventional maize. I have a very short time to sow the maize, I have to buy Conventional maize seed and it is not clear for me if I have obligation to do all these things.
Spain	3804	no	I am not informed, I do not know the technical guidelines.
Spain	3805	no	I am not enough information, I do not know well the technical guidelines, I need more and better information.
Spain	3806	no	It complicates the sowing. Conventional maize planted around by other farmers could be the refuge though this Conventional maize has a different cycle.
Spain	3807	no	I do not know the technical guidelines, I am not informed.
Spain	3808	no	I have not information, I do not know the technical guidelines.

Appendix B

Questionnaire

2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

Year - Event - Partner - Country -Interviewer- Farmer - Area

EuropaBio Monitoring WG
Farmer Questionnaire

Product: insect protected YieldGard® maize

Farmer personal and confidential data

Name of farmer: ______________________________

Address of farmer: ______________________________

City: ______________________________

Postal code: ______________________________

Name of interviewer: ______________________________

Date of interview (DD / MM / YYYY):_____/______/_________

The personal data of the farmer will be handled in accordance with applicable data protection legislation. The personal data of the farmers may be used for the purpose of interviews necessary for the survey if the farmers have authorised this use as per the data protection legislation.

The questionnaires will be encoded to protect farmers' identity in the survey and confidentiality agreements will be put in place between the different parties (i.e. authorisation holders, licensees, interviewers and analyst) to further enforce this. The identity of a farmer will only be revealed to the authorisation holders if an adverse effect linked to their trait has been identified and needs to be investigated.

Furthermore, the agreements between the different parties will also ensure that any information collected in the questionnaires will not be improperly shared or used.

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2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

Year - Event - Partner - Country -Interviewer- Farmer - Area

Code:

Year ☐☐☐☐ Event ☐☐ Partner ☐☐☐ Country ☐☐ Interviewer ☐☐

Farmer ☐☐ Area ☐☐

Coding explanations:

2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

Year | Event Code | Partner[1] Code | Country Code | Interviewer[2] Code | Farmer Code | Area Code

Codes:

Event: 01 MON 810
02 ...

Partner[1]: MON Monsanto
MAR Markin
AGR Agro.Ges
... ...

Country: ES Spain
PT Portugal
RO Romania
…

Interviewer[2]: 01 A
02 B
03 …

Farmer: incremental counter within the interviewer

Area: incremental counter within the farmer

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[1] Partner is the organization that implements the survey

[2] Interviewer is the employee from the Partner that is contacting the farmers

2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

Year - Event - Partner - Country -Interviewer- Farmer - Area

1 Maize grown area

1.1 Location:

Country: ____

County: ____

1.2 Surrounding environment:

Which of the following would best describe the land usage in the surrounding of the areas planted with YieldGard® maize

O Farmland
O Forest or wild habitat
O Residential or industrial

1.3 Size and number of fields of the maize cultivated area:

Total area of all maize cultivated on farm (ha) ________________

Total area of YieldGard® maize cultivated on farm (ha) ________________

Number of fields cultivated with YieldGard® maize ______________

1.4 Maize varieties grown:

List up to five YieldGard® maize varieties planted this season:

1. _________________________
2. _________________________
3. _________________________
4. _________________________
5. _________________________

List up to five conventional varieties planted this season:

1. _________________________
2. _________________________
3. _________________________
4. _________________________
5. _________________________

Are you growing any other GM maize varieties this season?[3]

O Yes O No

[3] Note: This question does not need to be asked in the 2012 season.

1.5 Soil characteristics of the maize grown area:

Mark the predominant soil type of the maize grown area (soil texture):

O very fine (clay)
O fine (clay, sandy clay, silty clay)
O medium (sandy clay loam, clay loam, sandy silt)
O medium-fine (silty clay loam, silt loam)loam)
O coarse (sand, loamy sand, sandy loam)
O no predominant soil type (too variable across the maize grown area on the farm)
O I do not know

Characterize soil quality of the maize grown area (fertility):

O below average - poor
O average - normal
O above average -good

Organic carbon content (%) ___________________

1.6 Local pest and disease pressure in maize:

Characterize this season's general pest pressure on the maize cultivated area:

Diseases (fungal, viral)	O Low	O As usual	O High
Pests (insects, mites, nematodes)	O Low	O As usual	O High
Weeds	O Low	O As usual	O High

2 Typical agronomic practices to grow maize on your farm

2.1 Irrigation of maize grown area:

O Yes O No

If yes, which type of irrigation technique do you apply:

O Gravity O Sprinkler O Pivot O Other

2.2 Major rotation of the maize grown area:

previous year: ________________________
two years ago: ________________________

2.3 Soil tillage practices:

O No O Yes (mark the time of tillage: O Winter O Spring)

2.4 Maize planting technique:

O Conventional planting
O Mulch
O Direct sowing

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2	0	1	2	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

Year - Event - Partner - Country -Interviewer- Farmer - Area

2.5 *Mark all typical weed and pest control practices in maize at your farm:*

O Herbicide(s)

O Insecticide(s)
If box checked, do you treat against maize borers? O Yes O No

O Fungicide(s)
O Mechanical weed control
O Use of bio control treatments (e.g. Trichogramma)
O Other, please specify: ____________________

2.6 *Application of fertilizer to maize grown area:*

O Yes O No

2.7 *Typical time of maize sowing* *range* *(DD:MM – DD:MM):*

_________/_________ -- _________/__________

2.8 *Typical time of maize harvest* *range* *(DD:MM – DD:MM):*

Grain maize: _________/_________ -- _________/__________
Forage maize: _________/_________ -- _________/__________

3 Observations of YieldGard® maize

3.1 *Agricultural practices in YieldGard® maize (compared to conventional maize)*

Did you change your agricultural practices in YieldGard® maize compared to conventional maize? If any of the answers is different from «As usual», please specify the change.

How did you perform your crop rotate for YieldGard® maize compared with conventional maize?

O As usual O Changed, because (*describe the rotation*): ______________

____

____

Did you plant YieldGard® maize earlier or later than conventional maize?

O As usual O Earlier O Later, because: _________________________

Did you change your soil tillage or maize planting techniques to plant YieldGard® maize?

O As usual O Changed, because: ________________________________

Full commercial name of insecticides you applied in YieldGard® maize field, including seed treatments:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

Full commercial name of herbicides you applied in YieldGard® maize field:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

Full commercial name of fungicides you applied in YieldGard® maize field:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

In 2012, how were the weed and pest control practices in YieldGard® maize when compared to conventional maize?

Insecticides: O Similar O Different, because:______________________

Herbicides: O Similar O Different, because:______________________

Fungicides: O Similar O Different, because:______________________

In 2012, did you change maize borer control practices in YieldGard® maize when compared to conventional maize?

O Similar O Changed, because:______________________

In 2012, how were the fertilizer application practices in YieldGard® maize when compared to conventional maize?

O Similar O Changed, because:______________________

In 2012, how were the irrigation practices in YieldGard® maize when compared to conventional maize?

O Similar O Changed, because:______________________________

Did you harvest YieldGard® maize earlier or later than conventional maize?

O Similar O Earlier O Later Because:______________________

3.2 *Characteristics of YieldGard® maize in the field (compared to conventional maize)*

Germination vigour	O As usual	O More vigorous	O Less vigorous
Time to emergence	O As usual	O Accelerated	O Delayed
Time to male flowering	O As usual	O Accelerated	O Delayed
Plant growth and development	O As usual	O Accelerated	O Delayed
Incidence of stalk/root lodging	O As usual	O More often	O Less often
Time to maturity	O As usual	O Accelerated	O Delayed
Yield	O As usual	O Higher yield	O Lower yield
Occurrence of volunteers from previous year planting (if relevant)	O As usual	O More often	O Less often

If any of the answers above is different from «As usual», please specify:
____
____
____
____

Please detail any additional unusual observations regarding the YieldGard® maize maize during its growth:____
____
____

3.3 Characterise the YieldGard® maize susceptibility to disease (compared to conventional maize)

Overall assessment of disease susceptibility of YieldGard® maize compared to conventional maize (fungal, viral diseases):

O As usual O More susceptible[4] O Less susceptible[4]

If the above answer is different from «As usual», please specify the difference in disease susceptibility in the list and the commentary section below:

1. *Fusarium* spp O More O Less
2. *Ustilago maydis = U. zeae* O More O Less
3. xxx O More O Less
4. xxx O More O Less
5. xxx O More O Less
6. Other: ____________________________ O More O Less

Additional comments: ____
____
____

3.4 Characterise the INSECT pest control in YieldGard® maize fields (compared to conventional maize)

On the two insects controlled by YieldGard® maize, overall efficacy of the GM varieties on:

1. European corn borer (Ostrinia nubilalis):

   O Very good O Good O Weak O Don't Know

2. Pink borer (Sesamia spp):

   O Very good O Good O Weak O Don't Know

Additional comments: ____
____
____

3.5 Characterise the YieldGard® maize susceptibility to OTHER pests susceptibility (compared to conventional maize)

Except the two insects mentioned above, overall assessment of pest susceptibility of YieldGard® maize compared to conventional maize (insect, mite, nematode pests):

O A usual O More susceptible O Less susceptible

[4] More susceptible than conventional maize or Less susceptible than conventional maize

If the above answer is different from «As usual», please specify the difference in pest susceptibility in the list and the commentary section below:

1. ________________________ O More O Less
2. ________________________ O More O Less
3. ________________________ O More O Less
4. ________________________ O More O Less
5. ________________________ O More O Less

Additional comments: ____

____

3.6 Characterise the weed pressure in YieldGard® maize fields (compared to conventional maize)

Overall assessment of the weed pressure in YieldGard® maize compared to conventional maize:

O As usual O More weeds O Less weeds

List the three most abundant weeds in your YieldGard® maize field:

1. ______________________________________
2. ______________________________________
3. ______________________________________

Were there any unusual observations regarding the occurrence of weeds in YieldGard® maize? ____

____

3.7 Occurrence of wildlife in YieldGard® maize fields (compared to conventional maize)

General impression of the occurrence of wildlife (insects, birds, and mammals) in YieldGard® maize compared to conventional maize fields:

Occurrence of insects (arthropods):

O As usual O More O Less O Do not know

If the answer above is «More» or «Less», please specify your observation:

____

Occurrence of birds:

O As usual O More O Less O Do not know

If the answer above is «More» or «Less», please specify your observation:

____

____

Occurrence of mammals:

O As usual O More O Less O Do not know

If the answer above is «More» or «Less», please specify your observation:

____

____

3.8 Feed use of YieldGard® maize (if previous year experience with this event)

Did you use the YieldGard® maize harvest for animal feed on your farm?

O Yes O No

If "Yes", please give your general impression of the performance of the animals fed YieldGard® maize compared to animals fed conventional maize.

O As usual O Different O Do not know

If the answer above is «Different», please specify your observation:

____

____

____

3.9 Any additional remarks or observations [e.g. from fields planted with event xxxx that were not selected for the survey]

____

____

____

____

____

4 Implementation of Bt-maize specific measures

4.1 Have you been informed on good agricultural practices for YieldGard® maize?

O Yes O No

Only if you answered "Yes", would you evaluate these technical sessions as:

O Very useful O Useful O Not useful

4.2 Seed

Was the seed bag labelled with accompanying specific documentation indicating that the product is genetically modified maize YieldGard® maize?

O Yes O No

Did you comply with the label recommendations on seed bags?

O Yes
O No, because:______________________________

____

____

____

4.3 Prevention of insect resistance

Did you plant a refuge in accordance to the technical guidelines?

O Yes
O No, because the surface of YieldGard® maize planted on the farm is < 5 ha
O No, because ______________________________

____

____

____