APPLIED STATISTICS AND INFORMATICS
IN LIFE SCIENCES

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

Biometrical annual Report on the 2016 growing season

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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.

Contents

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 [OJEC, 2001]. Monitoring efforts were supposed to detect the allegedly occurrence and impact of adverse effects of the GMO or its use as related to human health, animal health or the environment 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 implemented since 2006.

This biometrical report presents the outcomes of the statistical analysis of the farm questionnaires collected in Europe's major MON 810 cultivating countries Spain and Portugal in 2016. The questionnaires have been completed between January and March 2017. In the 2016 growing season 250 farmers have been surveyed.

2016 data indicate that in comparison to conventional maize plants, MON 810 plants

- received less insecticides caused by their inherent protection against certain lepidopteran pests,
- germinated more vigorously,
- 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 observed less as volunteers from previous year's planting caused by a more effective previous year's harvest,
- 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.

The identified deviations were 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.

1 Introduction

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

- 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 ERA.

Upon approval of MON 810 (Commission Decision 98/294/EC [OJEC, 1998]), 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 about 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 of MON 810 on the market poses negligible risk to human and animal health and the environment. Potential adverse effects of MON 810 on human and animal health and the environment, which were not anticipated in the ERA, 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 farm questionnaire approach and the analysis of the farm questionnaire results from the 2016 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.

2 Methodology

2.1 Tool for General Surveillance: the farm questionnaire

2.1.1 Structure of the farm questionnaire

Based on commonly defined protection goals, such as soil function, plant health and sustainable agriculture together with derived areas of potential impact on these protection goals, a range of relevant monitoring characters for MON 810 GS has been identified (Table 1). These monitoring characters might be influenced by the cultivation of MON 810, but in an agricultural landscape other influencing factors (Table 3) exist which need to be taken into account and they are therefore monitored as well.

For that purpose, a farm questionnaire was designed to obtain data on monitoring characters and influencing factors (see Appendix B). Deviating observations in monitoring characters would lead to an assessment of the collected information in order to determine whether the unusal observation is attributable to changes in influencing factors or the genetic modification. Farmers record a range of agronomic information and are the most frequent and consistent observers of crops and fields (*e.g.* by collection of field-specific records of seeds, tilling methods, physical and chemical soil analysis, fertilizer application, crop protection measures, biotic and abiotic damage, yields and quality). Additionally, farmers hold in "farm files", which are 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 Centre for Agriculture and Forestry (BBA, now JKI), maize breeders and statisticians in Germany [Wilhelm, 2004]. Its questions were developed in order to be to be easily understood, not to be too burdensome and 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 survey 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 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 usual 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. Therefore, most questions are formulated to identify deviation from the situation with conventional maize. Farmers are asked to assess the situation in comparison to conventional cultivation. If a farmer assesses the situation to be different, he is additionally asked to specify the direction of the difference; hence the category $Different$ is divided into two subcategories. To simplify this two-stage procedure in the questionnaire for most questions, three possible categories of answers are given: $As\ usual$, $Plus$ (*e.g.* later, higher, more) and $Minus$ (*e.g.* earlier, lower or less). Thus, a rather high frequency (> 10 %) of $Plus$- or $Minus$- answers would indicate possible effects (see Section 2.4).

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

2.1.2 Coding of personal data

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

2	0	1	6	-	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
	...	...
Interviewer:	01	A
	02	B
	03	...
Farmer:	farmer's ID within the interviewer	
Area:	incremental counter within the farmer	

(*e.g.* 2016-01-MAR-ES-01-01-01).

The data were stored and handled in accordance with the Data Protection Directive 95/46/EC [OJEC, 1995]. This is in order to ensure an honest response and to avoid competitive intelligence.

Within the data base, each questionnaire got a consecutive number (starting in 2006):

Furthermore, within the database each farmer has his own ID to follow multiple participitation in the MON 810 monitoring.

2.1.3 Training of interviewers

To assist the interviewers in filling out the questionnaires with the farmers, a 'user's manual' was developed. While questions have been carefully phrased to obtain accurate observations from farmers, preceding experience with the questionnaire may increase awareness.

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 1 provides an overview on the monitored characters and the protection goals that are addressed by them.

Table 1: Monitoring characters and corresponding protection goals

Monitoring characters	Protection goals
Crop rotation	Sustainable agriculture, plant health
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
Fertiliser application	Sustainable agriculture, soil function
Irrigation practices	Sustainable agriculture
Time of harvest	Sustainable agriculture, plant health
Germination vigour	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	Plant health, sustainable agriculture, biodiversity
Insect pest control (*Ostrinia nubilalis*)	Plant health, sustainable agriculture
Insect pest control (*Sesamia* spp.)	Plant health, sustainable agriculture
Pest susceptibility	Sustainable agriculture, plant health, biodiversity
Weed pressure	Sustainable agriculture, soil function, biodiversity
Occurrence of insects	Biodiversity
Occurrence of birds	Biodiversity
Occurrence of mammals	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 to then use it/them as comparator(s). The farmers additionally use their general experience of cultivating conventional maize, thereby especially assessing the seasonal specifics. Farmers usually know whether observed differences are based on *e.g.* different varieties' maturity groups. For most questions, the possible categories of answers $As\ usual$ and $Different$, with the latter category subdivided into $Plus$ (*e.g.* later, higher, more) or $Minus$ (*e.g.* earlier, lower or less) were given (see Table 2).

Table 2: Monitoring characters and their categories

	Monitoring characters – observations of MON 810	*As usual*	*Different Minus*	*Different Plus*
Agronomic practices	Crop rotation	as usual	-	changed
	Time of planting	as usual	earlier	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
	Fertiliser application	as usual	-	changed
	Irrigation practices	as usual	-	changed
	Time of harvest	as usual	earlier	later
Characteristics in the field	Germination vigour	as usual	less	more
	Time to emergence	as usual	accelerated	delayed
	Time to male flowering	as usual	accelerated	delayed
	Plant growth and development	as usual	accelerated	delayed
	Incidence of stalk/root lodging	as usual	less	more
	Time to maturity	as usual	accelerated	delayed
	Yield	as usual	lower	higher
	Occurrence of MON 810 volunteers	as usual	less	more
Einvironment and wildlife	Disease susceptibility	as usual	less	more
	Insect pest control (*Ostrinia nubilalis*)	good	weak	very good
	Insect pest control (*Sesamia* spp.)	good	weak	very good
	Pest susceptibility	as usual	less	more
	Weed pressure	as usual	less	more
	Occurrence of insects	as usual	less	more
	Occurrence of birds	as usual	less	more
	Occurrence of mammals	as usual	less	more
	Performance of fed animals	as usual	-	changed

2.3 Definition of influencing factors

Besides named monitoring characters, several potentially influencing factors were surveyed to assess the local conditions and to determine the cause of potential effects in the monitoring characters (Table 3).

Table 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 is well formulated and unambiguous - one would expect a predominant part of the farmers assessing the situation to be *As usual*. Small frequencies of differing answers result for example from uncertainty or environmental impacts and are expected to be balanced in both *Plus* and *Minus* direction and to run up to approximately 5 % (Figure 1). Therefore, the ***baseline*** for the analysis of monitoring characters with categories *As usual* and *Different* is 90 % - 10 %, where *Plus*- and *Minus*- answers are balanced and both about 5 %.

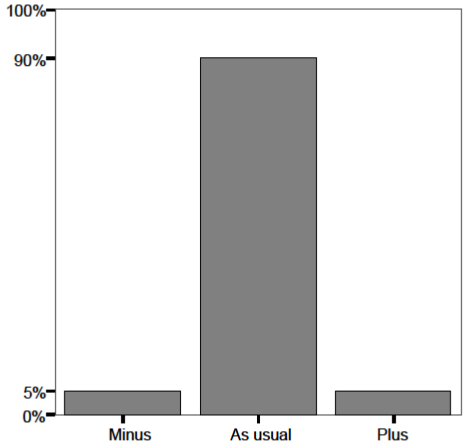

Figure 1: Balanced (expected) baseline distribution of the farmers' answers (no effect)

An effect of the cultivation of MON 810 or any other influencing factor would arise in a greater percentage of *Different* (*i.e. Plus*- or *Minus*-) answers, where "greater" or an ***effect***, was quantitatively defined by exceeding a threshold of 10 % (Figure 2(a) and (b)). Graphically, an effect would be expressed by an unbalanced distribution (Figure 3(a) and (b)).

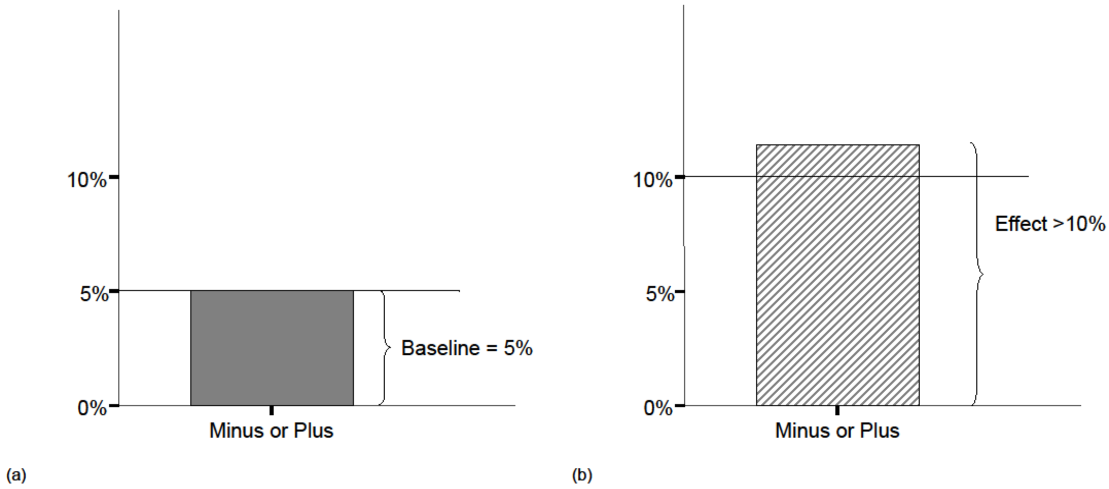

Figure 2: Definition of (a) baseline and (b) effect

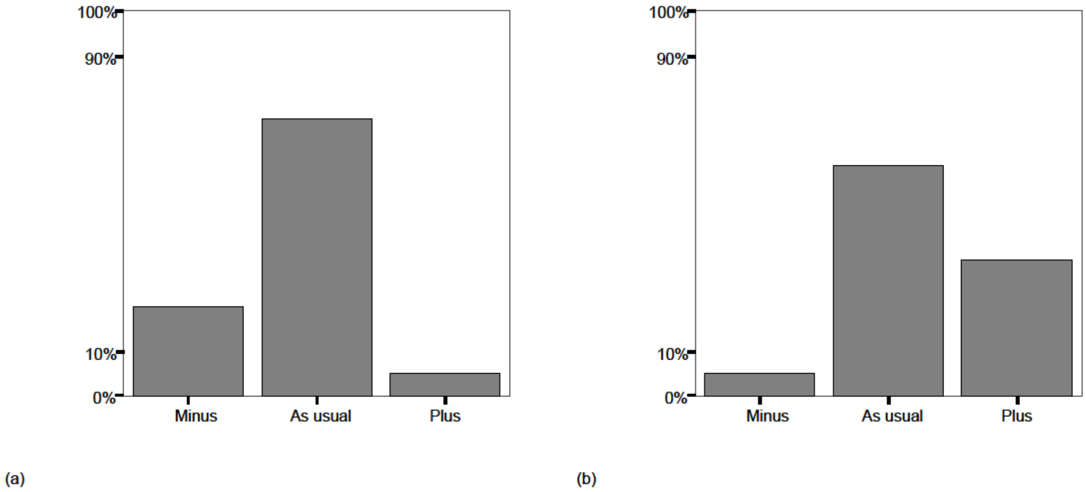

Figure 3: Examples for distributions of farmers' answers indicating an effect (a) > 10 % in category $Minus$ → effect, (b) > 10 % in category $Plus$ → effect

To detect an effect the proportions of *Different* (*i.e. Plus* - or *Minus* -) answers have to be compared with the threshold of 10 % by a statistical test (one-sided, comparison of a probability with a constant). Since the *As usual-*, and *Different-* (*i.e. Plus-* or *Minus-*) answers complement each other, a closed test procedure is applied: first the *As usual-* proportion is compared with the threshold of 90%. If the *As usual-* proportion exceeds this threshold, the *Different-* (*i.e. Plus-* or *Minus-*) proportions cannot exceed the 10% and no effect is indicated. Otherwise, the *Different-* (*i.e. Plus-* or *Minus-*) proportions are to be compared with the 10% threshold and an effect is indicated if the threshold is exceeded by a *Different-* (*i.e. Plus-* or *Minus-*) proportion.

The frequencies of *As usual-*, and *Different-* (*i.e. Plus-* or *Minus-*) answers are statistically tested according to the closed principle test procedure (in case of questions that allow for only two answers like *e.g. Crop Rotation's* “as usual”/”changed”, only *as usual*- and *plus*-answer frequencies are tested accordingly).

The categories *As usual*, *Plus* and *Minus* form a vector with a multinomial distribution

$$(Minus, As\, usual, Plus) \sim Mult(n; p_{Minus}, p_{As\, usual}, p_{Plus})$$

Therefore, each component of this vector is binomially distributed

$$Minus \sim B(n, p_{Minus}, k),\; As\, usual \sim B(n, p_{As\, usual}, k),\; Plus \sim B(n, p_{Plus}, k)$$

To detect an effect of MON810 cultivation, the following statistical hypothesis are formulated:

$$H_0^1 : p_{As\, usual} \leq 0.9 \quad \text{vs. } H_A^1 : p_{As\, usual} > 0.9$$

$$H_0^2 : p_{Minus} \geq 0.1 \quad \text{vs. } H_A^2 : p_{Minus} < 0.1$$

$$H_0^3 : p_{Plus} \geq 0.1 \quad \text{vs. } H_A^3 : p_{Plus} < 0.1$$

The set of null hypothesis $\{H_0^1, H_0^2, H_0^3\}$ is <u>closed under intersection</u> because

$$H_0^1 \quad H_0^2 = [0,0.9] \quad [0.1,1] = [0.1,0.9] \in [0,1] = \{H_0^1, H_0^2, H_0^3\} \text{ and}$$

$$H_0^1 \quad H_0^3 = [0,0.9] \quad [0.1,1] = [0.1,0.9] \in [0,1] = \{H_0^1, H_0^2, H_0^3\} \text{ and}$$

$$H_0^2 \quad H_0^3 = [0.1,1] \quad [0.1,1] = [0.1,1] \in [0,1] = \{H_0^1, H_0^2, H_0^3\}.$$

The detection of an effect is made in two steps. First, the global null hypothesis $H_0^1 : p_{As\, usual} \leq 0.9$ is tested. If this hypothesis is rejected, testing of the hypotheses H_0^2 and H_0^3 is not needed anymore since they will be rejected then, too. Secondly, if $H_0^1 : p_{As\, usual} \leq 0.9$ is not rejected, the hypotheses H_0^2 and H_0^3 are to be tested. The test procedure is displayed in Figure 4.

This test procedure is <u>coherent</u> because a rejection of the null hypothesis in step 1 implies a rejection of the hypotheses in step 2. The test procedure is called a closed test procedure.

Within the closed test principle, hypotheses are tested by applying the exact binomial test.

- Step (1): Test of the probability $p_{As\ usual}$ (usually the largest probability)
  Null hypothesis: GMP cultivation has an effect, the probability of getting $As\ usual$ -answers is smaller than 90 % (H_0: $p_{As\ usual} \leq 0.9$)
- Step (2): Test of the p_{Minus} probabilities and p_{Plus} probabilities
  Null hypothesis: GMP cultivation has an effect, the probability of getting $Minus$- or $Plus$-answers is larger than 10 % (H_0: $p_{Minus} \geq 0.1$, H_0: $p_{Plus} \geq 0.1$)

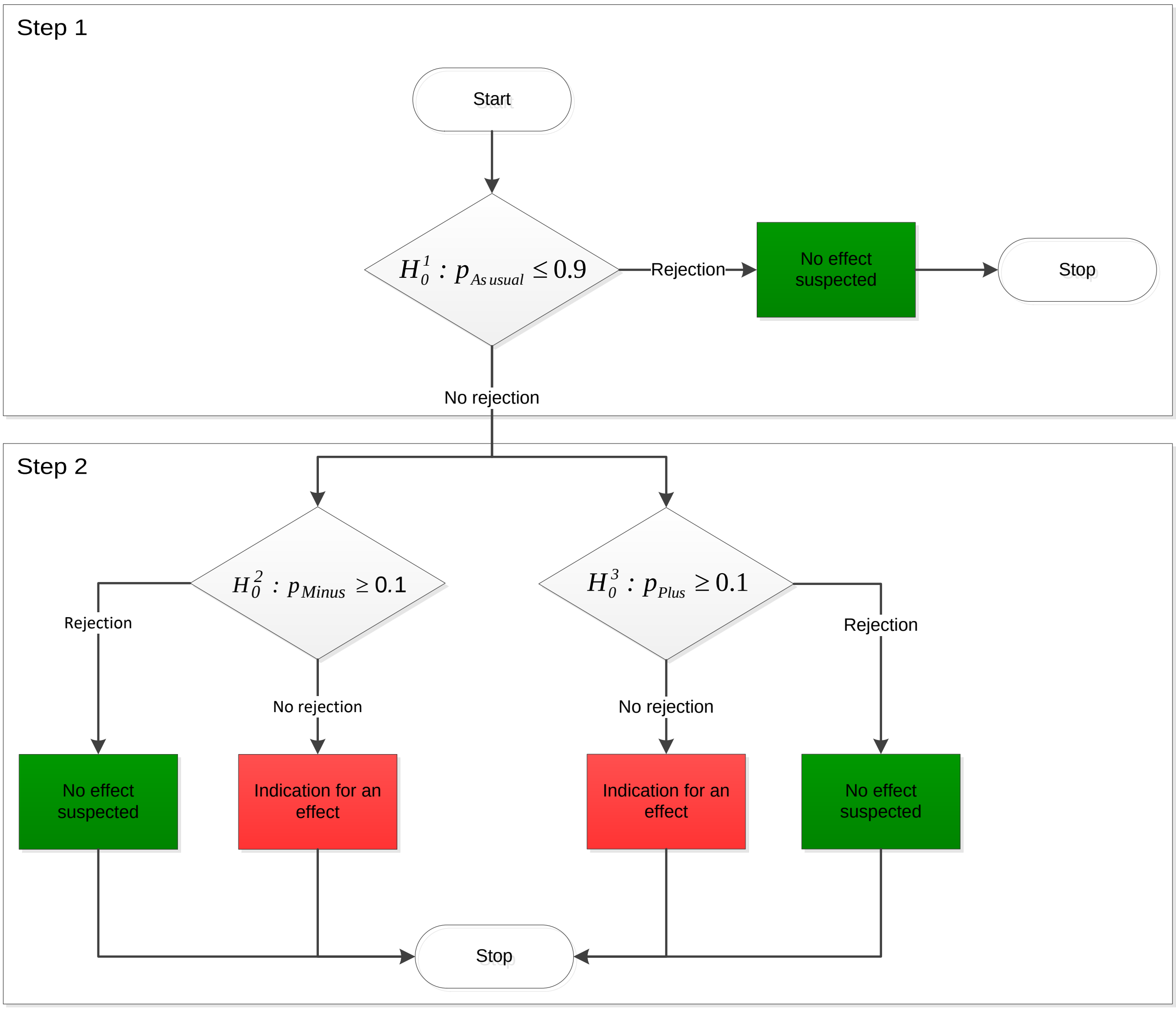

Figure 4: Closed test procedure for the three probabilities of $As\ usual$, $Plus$- and $Minus$-answers

This closed test procedure controls for the experiment-wise error rate because an erroneous decision, *i.e.* an error of the first kind (rejection of the null hypothesis although it is true) during the whole procedure can only be done once: an erroneous rejection of the null hypothesis (1) (*i.e.* in reality $p_{As\ usual} \leq 0.9$) corresponds to an erroneous rejection of the null hypotheses (2) (*i.e.* in reality $p_{Plus} \geq 0.1$ or $p_{Minus} \geq 0.1$) [Marcus, 1976], [Maurer, 1995].

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

1. The frequencies of the farmer responses 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, answers are accounted as missing values and therefore not considered valid. As a consequence, the "valid percentages" state the proportions of actually known answers, 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 to illustrate the distribution function and for quality control reasons.

2. The frequencies of *As usual*, *Plus*- and *Minus*- answers are statistically tested according to the closed principle test procedure as described above (in case of questions that allow for only two answers like *e.g. Crop Rotation's* "as usual"/"changed", only *As usual*- and *Plus*- answer frequencies are tested accordingly).

   The resulting P-values are compared to a level of significance $\alpha = 0.01$. If the P-value is smaller than $\alpha = 0.01$, the corresponding null hypothesis is rejected. If the P-value is larger than $\alpha = 0.01$, respective hypothesis cannot be rejected.

   - In case Hypothesis (1) with $p_{As\,usual} \leq 0.9$ is rejected, no effect is indicated.
   - In case Hypothesis (1) with $p_{As\,usual} \leq 0.9$ cannot be rejected, but both hypotheses (2) with $p_{Minus} \geq 0.1$ and $p_{Plus} \geq 0.1$ can be rejected, no effect is indicated.
   - In case Hypothesis (1) with $p_{As\,usual} \leq 0.9$ cannot be rejected and at least one of the hypotheses (2) cannot be rejected either, an effect is indicated.

   (See Figure 4 for a flow chart of the above named decision making processes.)

3. Where an effect is indicated, the effect must be interpreted (adverse/beneficial).
4. Where an adverse effect is identified, the cause of the effect must be ascertained (MON 810 cultivation or other influencing factors).
5. Identification of adverse effects potentially caused by MON 810 cultivation would require further examinations. Such cases, however, have neither been found in this years', nor in previous years' data.

Subsequently, 99 % confidence intervals are calculated for the $p_{As\,usual}$, p_{Minus} and p_{Plus} . The probabilities of, *As usual*, *Plus*- and *Minus*- answers with corresponding confidence intervals are illustrated graphically.

2.5 Sample size determination and selection

The sample size determination of the survey was done for a period of 10 years (authorization period). It was based on the exact binomial test. 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, 2007a].

The error of the first kind is the probability to reject the null hypothesis although it is true, *i.e.* not to identify an existing effect. This probability should be as small as possible since it is the aim of GS to identify any existing 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.* to identify an effect although none exists. This probability should also be as small as possible as it would raise false alarm (Table 4). The error of the second kind is also called producer's risk.

The magnitude of the effect size d was chosen from experience in analyzing farm questionnaires in a pilot study in Germany 2001 - 2005 [Schmidt, 2008].

Table 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	
		$p \leq 0.9$ **Indication for an effect**	$p > 0.9$ **No effect**
Test decision	**Acceptance** $H_0 : p \leq 0.9$	Correct decision with Probability $1-\alpha = 99\ \%$	Wrong decision with Probability $\beta = 1\ \%$
	Rejection $H_0 : p \leq 0.9$	Wrong decision with Probability $\alpha = 1\ \%$	Correct decision with Probability $1-\beta = 99\ \%$ $= POWER$

CADEMO light [Cademo, 2006] was used as proposed by [Rasch, 2007a] to determine the sample size for a binomial test (Method 3/62/1005). Within this survey the accuracy demands $p = 0.9$ (threshold for adverse effects to be tested: 90 % of $As\ usual$ -answers, $\alpha = 0.01$ (error of the first kind), $\beta = 0.01$ (error of the second kind), and $d = 3\ \%$ (minimum difference of practical interest) should be met. Under these demands for a one sample problem, testing a probability against a threshold with a one-sided test, a sample size of 2 436 questionnaires was calculated. To get this sample size even in the case of questionnaires having to be excluded from the survey *e.g.* because of low quality, this number was rounded to 2 500 questionnaires.

Since the monitoring objects are fields where genetically modified crops are cultivated, the total population consists of all fields within the EU being cultivated within the 10-years authorization period. From this population a maximum of 2 500 fields has to be selected for the GS survey. Sampling of these 2 500 fields should ensure to reflect the range and distribution of plant production systems and environments exposed to GMP cultivation. This range is on one hand characterized by the growing season (year and its climatic, environmental conditions), while on the other hand, it is characterized by the geographic regions where GM cultivation takes place. Regions may vary in terms of their production systems, regulatory requirements, agro-political and socio-economic conditions and therefore are best described by European countries. Consequently, sampling takes place within strata (defined by years and countries of cultivation).

The total number of 2 500 monitoring objects is firstly equally subdivided into 250 objects per year. It is then tried to consider the fluctuant adoption of the GMP (grade of market maturity) by assigning these 250 objects to the respective countries on a yearly basis. Consequently, the sample cultivation areas with a high uptake of the GMP may be over-represented by a large number of monitored fields, while as countries with proportionally very low cultivation may be excluded from the monitoring. If fewer than 250 fields per year are cultivated, the maximum possible number of monitoring objects is surveyed.

In a second step, a quota considering

- the countries of MON810 cultivation in the respective year,
- the magnitude of MON 810 cultivation (ha planted per country/ ha planted in the EU) and
- local situation (average field size in the country)

is applied.

In reality, the sampling procedure is afflicted by several challenges:

- the total population of interest, i.e. the total number of fields (and the field sizes) is not known,
- the development of areas of MON810 cultivation cannot be predicted,
- for the definition of the yearly sampling frame, not the total number of fields but only the total cultivated area (in ha, see Table 12) is known.

Therefore the sampling frame for this survey cannot be based on the total population of fields with MON 810 cultivation in Europe. Instead, each year the total MON 810 cultivated area (in ha) is known.

Table 12 shows the cultivation areas of 2016. Czech Republic and Slovakia because of very low cultivation were excluded from the monitoring. For Protugal and Spain, the number of survey completions targeted from each country was set in proportion to the country's MON810-planted area:

Table 5: Sampling number proportional to cultivated MON810 area in Portugal and Spain 2016

Country	MON 810 area	No of questionnaires
Portugal	7 056	13
Spain	129 081	237
Total	136 137	250

This procedure was repeated within the countries:

Portugal:

Table 6: Sampling number proportional to cultivated MON810 area in Portugal 2016

Region	MON 810 area	% of country surface	Proportional No of questionnaires	Sampling
Norte	100.48	1.4%	0	0
Centro	1485.47	21.1%	3	3
Lisboa e Vale do Tejo	2124.87	30.1%	4	4
Alentejo	3345.93	47.4%	6	6
Total	7056.75	100%	13	13

Norte because of very low cultivation were excluded from the monitoring.

Spain:

Table 7: Sampling number proportional to cultivated MON810 area in Spain 2016

Region	MON 810 area	% of country surface	Proportional No of questionnaires	Sampling
Andalucia	10918.82	8.5%	20	20
Aragon	46546.35	36.1%	85	162
Cataluna	41567.47	32.2%	76	
Castilla Leon	168.53	0.1%	0	0
Castilla-La-Mancha	5931.59	4.6%	11	12
Comunidad de Madrid	402.12	0.3%	1	
Comunidad Foral de Navarra	8066.24	6.2%	15	15
Comunidad Valenciana	302.35	0.2%	1	0
Extremadura	15039.41	11.7%	28	28
Islas Baleares	127.65	0.1%	0	0
La Rioja	9.71	0.0%	0	0
Pais Vasco	0.88	0.0%	0	0
Total	129081.12	100.0%	237	237

Revised sampling allocation in Spain

1. Aragón + Cataluña = one region

   Castilla-La-Mancha + Dcommunidad de Madrid = one region

Justification: data available are an estimation of planted area based on company sales of MON 810 seeds (company to distributors), but distributors sell to point of sales and farmers that can be or cannot be in the same province/region as in the sales report

--> discrepancies to official report of planted area

2. no sampling in Comunidad Valenciana

Justification: marginal cultivation in Comunidad Valenciana, maize is very atypical and it may be the case that only 1 farmer is cultivating there or is a farmer in Albacete but buying the seeds in a distributor placed in Valencia

Within each region, the determined number of fields needed to be selected. For data survey, the contact details of the cultivating farmers needs to be identified. GMO cultivation register information - where publicly available - is used to identify the regions of cultivation. It cannot not be used to identify the cultivating farmers since in most countries the personal data of farmers are not freely available. Farmers therefore are selected from customer lists of the seed selling companies or interviewer companies, plus experience from previous surveys or search in the region. When buying the seeds, farmers are informed to possibly be contacted for a survey. All farmer refusals are recorded.

The whole sampling procedure ensured that the monitoring area was proportional to and representative of the total regional area under GM cultivation in 2016.

2.6 Power of the Test

The power of the test $p_{Minus} \geq 0.1$, $p_{Plus} \geq 0.1$, respectively is the probability to reject the null hypothesis of an effect where none exists (correct decision). It is defined as $1 - \beta$ (β = error of the second kind) and is calculated as followed:

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

where:

$F_u = \min_F (P(F \leq F_E | H_0) > \alpha$

p = given probability of $Plus$- or $Minus$ -answers for which the power is calculated

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

Figure 5 illustrates the power for an alternative hypothesis value of 0.13 (effect size 0.03). The distribution of the null hypothesis value (0.10) is represented by the red curve; the distribution of the alternative hypothesis value (0.13) is represented by the blue curve. The green line shows the critical value for an error probability $\alpha = 0.01$. If the alternative hypothesis is actually true (GM cultivation has no effect) the rejection of the null hypothesis is a correct decision which will occur with 99 % probability (under the blue curve to the left of the green line), *i.e.* with a power of 99 %.

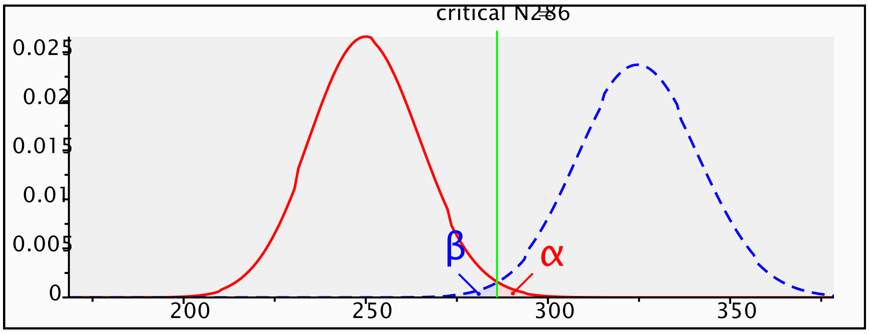

Figure 5: Null ($p = 0.1$) and alternative ($p = 0.13$) binomial distribution functions for a sample size of 2 500 type I and type II errors α and β both 0.01 (graph: G*Power Version 3.1.6)

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 farmers were asked for clarification. Afterwards, these entries in the database were corrected. For quantitative variables (*e.g.* total maize area in ha) the real values from the questionnaire were taken for the database, for qualitative variables the possible parameter values (e.g. *As usual/ Plus/ Minus*) were defined and coded (and only the coded values taken).

High quality of the data is assured by preliminarily training the interviewers in a workshop via phone on a yearly basis. 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 receive the questionnaire about two weeks in advance to pick up the information from their documentation. In 2016, all interviews were conducted face-to-face.

All data are entered and controlled for their quality and plausibility. A quality control check first verifies the completeness of the data. Some data fields (especially the monitoring characters or comments in case the farmer's assessments differ from *As usual*) are defined to be mandatory, therefore missing values or unreadable entries are not accepted. Furthermore, the values are verified for correctness (quantitative values within a plausible min-max range, qualitative values meeting only acceptable values). A plausibility control validates the variable values for their contents, both to identify 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 (in these cases interviewers receive corresponding queries from BioMath).

3 Results

The questionnaires have been completed between January and March 2017. In the 2016 growing season 250 farm questionnaires have been collected. Quality and plausibility control confirmed that all 250 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 were identified.

An overview of numbers, percentages and levels of significance for the binomial tests of the data in 2016 is given in Table 8. The fields in the table highlighted in grey mark the cases for which the test against the 0.9/ 0.1 thresholds resulted in P-values greater than or equal to 0.01, so the null hypotheses (that these values are smaller than 0.9 or greater than 0.1, respectively) could not be rejected and therefore indicate the occurrence of an effect.

Table 9 lists the probabilities of *As usual*- / *Plus*- / *Minus*- answers for the monitoring characters together with corresponding 99 % confidence intervals. All probabilities with confidence intervals are shown on the same graph (for each of the *As usual*- / *Plus*- / *Minus* - answers) in Figure 6, thereby forming an overall pattern and allowing the assessment of MON 810 effects at one glance. The vertical dashed lines indicate the test thresholds of 0.9/ 0.1 (biological relevance).

No effect of MON 810 is indicated if

- for the *As usual*- probabilty the lower confidence bound is greater than the threshold of 0.9, *i.e.* the whole confidence interval lies on the right side of the dashed line or

An effect of MON 810 is indicated if

- for the *As usual*- probabilty the threshold lies between the lower and upper confidence bounds, *i.e.* the confidence interval crosses the dashed line.
- for the *As usual*- probabilty the upper confidence bound is smaller than the threshold, *i.e.* the whole confidence interval lies on the left side of the dashed line.

Table 8: Overview on the results of the closed test procedure for the monitoring characters in 2016

Monitoring character	N valid	*As usual*	P for $p_0 = 0.9$	*Minus*	P for $p_0 = 0.1$	*Plus*	P for $p_0 = 0.1$
Crop rotation	250	246 (98.4%)	< 0.01				
Time of planting	250	244 (97.6%)	< 0.01				
Tillage and planting technique	250	247 (98.8%)	< 0.01				
Insect control practices	250	231 (92.4%)	0.081			19 (7.6%)	0.121
Weed control practices	250	250 (100.0%)	< 0.01			0 (0.0%)	
Fungal control practices	250	250 (100.0%)	< 0.01			0 (0.0%)	
Maize borer control practice	250	232 (92.8%)	0.051			18 (7.2%)	0.081
Fertilizer application	250	250 (100.0%)	< 0.01			0 (0.0%)	
Irrigation practices	250	249 (99.6%)	< 0.01			1 (0.4%)	
Time of harvest	250	245 (98.0%)	< 0.01	0 (0.0%)		5 (2.0%)	
Germination vigor	250	228 (91.2%)	0.234	1 (0.4%)	< 0.01	21 (8.4%)	0.234
Time to emergence	250	238 (95.2%)	< 0.01	10 (4.0%)		2 (0.8%)	
Time to male flowering	250	248 (99.2%)	< 0.01	2 (0.8%)		0 (0.0%)	
Plant growth and development	250	244 (97.6%)	< 0.01	5 (2.0%)		1 (0.4%)	
Incidence of stalk / root lodging	250	167 (66.8%)	1.0	83 (33.2%)	1.0	0 (0.0%)	< 0.01
Time to maturity	250	213 (85.2%)	0.990	0 (0.0%)	< 0.01	37 (14.8%)	1.0
Yield	250	132 (52.8%)	1.0	1 (0.4%)	< 0.01	117 (46.8%)	1.0
Occurrence of volunteers	250	221 (88.4%)	0.774	29 (11.6%)	0.830	0 (0.0%)	< 0.01
Disease susceptibility	250	233 (93.2%)	0.031	17 (6.8%)	0.051	0 (0.0%)	< 0.01
Pest susceptibility	250	218 (87.2%)	0.911	32 (12.8%)	0.9389	0 (0.0%)	< 0.01
Weed pressure	250	249 (99.6%)	< 0.01	1 (0.4%)		0 (0.0%)	
Occurrence of insects	250	250 (100.0%)	< 0.01	0 (0.0%)		0 (0.0%)	
Occurrence of birds	250	249 (99.6%)	< 0.01	1 (0.4%)		0 (0.0%)	
Occurrence of mammals	250	249 (99.6%)	< 0.01	1 (0.4%)		0 (0.0%)	
Performance of animals	5	5 (100.0%)	< 0.01			0 (0.0%)	0.590

For grey highlighted probability values the binomial test against the threshold of 90 % for $As\ usual$-answers or 10 % for $Minus$ - or $Plus$-answers, respectively, resulted in p-values greater than $\alpha = 0.01$, so the null hypotheses, that these values are smaller than 90 % for $As\ usual$-answers or greater than 10 % for $Minus$ - or $Plus$-answers, respectively, could not be rejected, *i.e.* an effect is indicated.

Table 9: Overview on the $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of the monitoring characters and corresponding 99 % confidence intervals

Monitoring character	$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
Crop rotation	98.4%	96.4%	100.4%	-	-	-	1.6%	0.0%	3.6%
Time of planting	97.6%	95.1%	100.1%	0.8%	0.0%	2.3%	1.6%	0.0%	3.6%
Tillage and planting technique	98.8%	97.0%	100.6%	-	-	-	1.2%	0.0%	3.0%
Insect control practices	92.4%	88.1%	96.7%	-	-	-	7.6%	3.3%	11.9%
Weed control practices	100.0%	100.0%	100.0%	-	-	-	0.0%	0.0%	0.0%
Fungal control practices	100.0%	100.0%	100.0%	-	-	-	0.0%	0.0%	0.0%
Maize Borer control practice	92.8%	88.6%	97.0%	-	-	-	7.2%	3.0%	11.4%
Fertilizer Application	100.0%	100.0%	100.0%	-	-	-	0.0%	0.0%	0.0%
Irrigation Practices	99.6%	98.6%	100.6%	-	-	-	0.4%	0.0%	1.4%
Time of harvest	98.0%	95.7%	100.3%	0.0%	0.0%	0.0%	2.0%	0.0%	4.3%
Germination vigor	91.2%	86.6%	95.8%	0.4%	0.0%	1.4%	8.4%	3.9%	12.9%
Time to emergence	95.2%	91.7%	98.7%	4.0%	0.8%	7.2%	0.8%	0.0%	2.3%
Time to male flowering	99.2%	97.7%	100.7%	0.8%	0.0%	2.3%	0.0%	0.0%	0.0%
Plant growth and development	97.6%	95.1%	100.1%	2.0%	0.0%	4.3%	0.4%	0.0%	1.4%
Incidence of stalk / root lodging	66.8%	59.1%	74.5%	33.2%	25.5%	40.9%	0.0%	0.0%	0.0%
Time to maturity	85.2%	79.4%	91.0%	0.0%	0.0%	0.0%	14.8%	9.0%	20.6%
Yield	52.8%	44.7%	60.9%	0.4%	0.0%	1.4%	46.8%	38.7%	54.9%
Occurrence of volunteers	88.4%	83.2%	93.6%	11.6%	6.4%	16.8%	0.0%	0.0%	0.0%
Disease susceptibility	93.2%	89.1%	97.3%	6.8%	2.7%	10.9%	0.0%	0.0%	0.0%
Pest susceptibility	87.2%	81.8%	92.6%	12.8%	7.4%	18.2%	0.0%	0.0%	0.0%
Weed pressure	99.6%	98.6%	100.6%	0.4%	0.0%	1.4%	0.0%	0.0%	0.0%
Occurrence of insects	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Occurrence of birds	99.6%	98.6%	100.6%	0.4%	0.0%	1.4%	0.0%	0.0%	0.0%
Occurrence of mamals	99.6%	98.6%	100.6%	0.4%	0.0%	1.4%	0.0%	0.0%	0.0%
Performance of animals	100.0%	100.0%	100.0%	-	-	-	0.0%	0.0%	0.0%

Grey highlighted confidence intervals cross the threshold of 90 % for $As\ usual$-answers or 10 % for $Minus$ - or $Plus$-answers, respectively, so the null hypotheses, that these values are smaller than 90 % for $As\ usual$-answers or greater than 10 % for $Minus$ - or $Plus$-answers, respectively, could not be rejected, *i.e.* an effect is indicated.

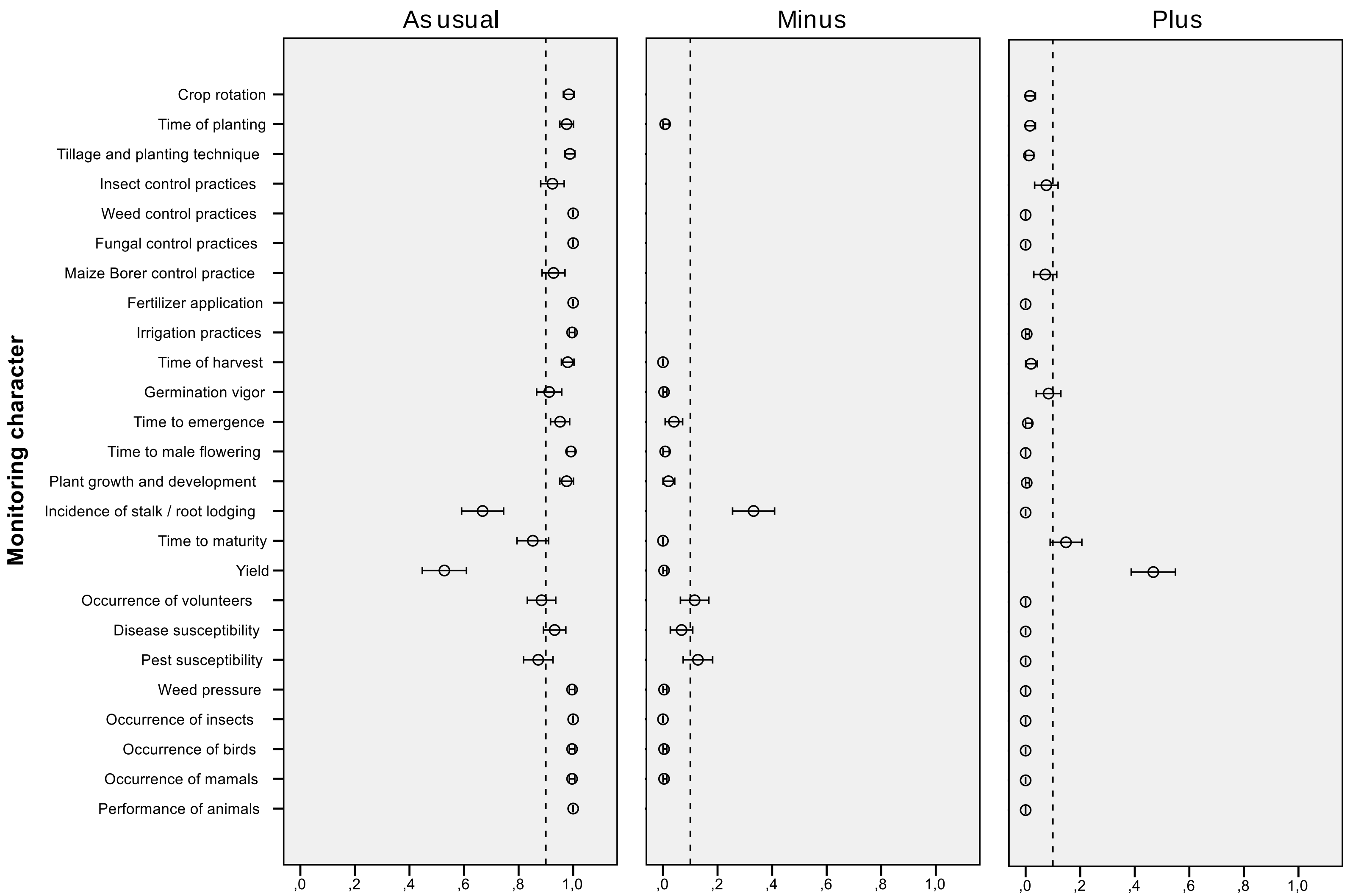

Figure 6: $As\ usual$- , $Plus$- and $Minus$ - answer probabilities of all monitoring characters, point estimates (circle) and 99 % confidence intervals (bars). Vertical dashed line indicates the test thresholds of 0.9 or 0.1, respectively (biological relevance)

Taken together, 2016 data indicate that in comparison to conventional maize, MON 810 plants

- received less insecticides,
- germinated more vigourously,
- had less incidence of stalk/root lodging,
- had a longer time to maturity,
- gave a higher yield,
- showed less volunteers,
- were less susceptible to pests other than corn borers, especially lepidopteran pests.

In the following sections the detailed analysis of all parameters surveyed using the questionnaire in 2016 is described and the results are assessed scientifically.

3.1 Sampling and quality and plausibility control

The questionnaires have been completed between January and March 2017. In the 2016 growing season 250 farm questionnaires have been collected.

In Spain, the largest market, the surveys (237) were performed by Instituto Markin, SL[2], in Portugal the surveys (13) were performed by Agro.Ges - Sociedade de Estudos e Projectos[3]. These companies have an established experience in agricultural surveys.

In Portugal, none of the contacted farmers refused to participate. The response rate was 100%. 2 interviewed farmers for the first time took part in the survey. According to the sampling scheme, the farmers came from the following regions:

Table 10: Number of farmers interviewed in Portugal 2016

Region	No of farmers
North	0
Center	3
Lisbon and Tagus Valley	4
Alentejo	6
Total	13

In Spain, 466 farmers were contacted, 229 did not respond for the following reasons: because they did not grow MON810 in 2016 (72), they did not grow maize in 2016 (43), they growed MON810 in 2016 but refused to sign the consent form (42), they grew MON810 in 2016 but refused to answer the interview, they were absent or could not be localized (14) they were retired (9), they were sick in the time to make the interview (7). The response rate was 50.9%. 177 interviewed farmers for the first time

[2] Instituto Markin, SL; c/ Caleruega, 60 4º D -28033 Madrid -Spain
[3] Agro.Ges -Sociedade de Estudos e Projectos, Av. da República, 412, 2750-475 Cascais -Portugal

took part in the survey. According to the sampling scheme, the farmers came from the following regions:

Table 11: Number of farmers interviewed in Spain 2016

REGION	No of farmers	
CATALUÑA - ARAGÓN		163
Lérida	77	
Huesca	59	
Zaragoza	27	
NAVARRA		15
Navarra	15	
EXTREMADURA		28
Badajoz	10	
Cáceres	18	
ANDALUCÍA		20
Sevilla	20	
CASTILLA- LA MANCHA		11
Albacete	11	
TOTAL INTERVIEWS		237

After the first quality and plausibility control, 13 inconsistencies occurred in the questionnaires: 2 cases of multiple choices, 5 incorrect pesticide/ variety names and 6 inconsistencies to additional questions in the Annex 2016. After including the corrections, the quality and plausibility control confirmed that all 250 questionnaires could be considered for analysis.

The high quality of the questionnaires can also be ascribed to the interviewer training.

The database currently contains 2 877 cases (questionnaires) for 11 field seasons: 252 for 2006, 291 for 2007, 297 for 2008, 240 for 2009, 271 for 2010, 249 for 2011, 249 for 2012, 256 for 2013, 261 for 2014, 261 for 2015, and 250 for 2016.

3.2 Part 1: Maize grown area

3.2.1 Location

In 2016, 250 questionnaires were surveyed in the cultivation areas of MON 810 in Spain and Portugal. With an area of 129 081 ha in Spain and 7 056 ha in Portugal, these two countries represent Europes largest MON 810 cultivators. Of these areas, 5.2 % and 14.6 % were monitored in this study for Spain and Portugal, respectively (Table 12).

Figure 7 shows a geographical overview on the cultivation areas of MON 810 in Europe in 2016 (dark grey areas) and the location of the monitoring sites (numbers).

Table 12: MON 810 cultivation and monitored areas in 2016

Country	Total planted MON 810 area (ha)	Monitored MON 810 area (ha)	Monitored MON 810 area / total planted MON 810 area (%)
Spain	129081	6768	5.2
Portugal	7056	1027	14.6
Slovakia	122	0	0.0
Czech Republic	75	0	0.0
Total	136334	7795	5.7

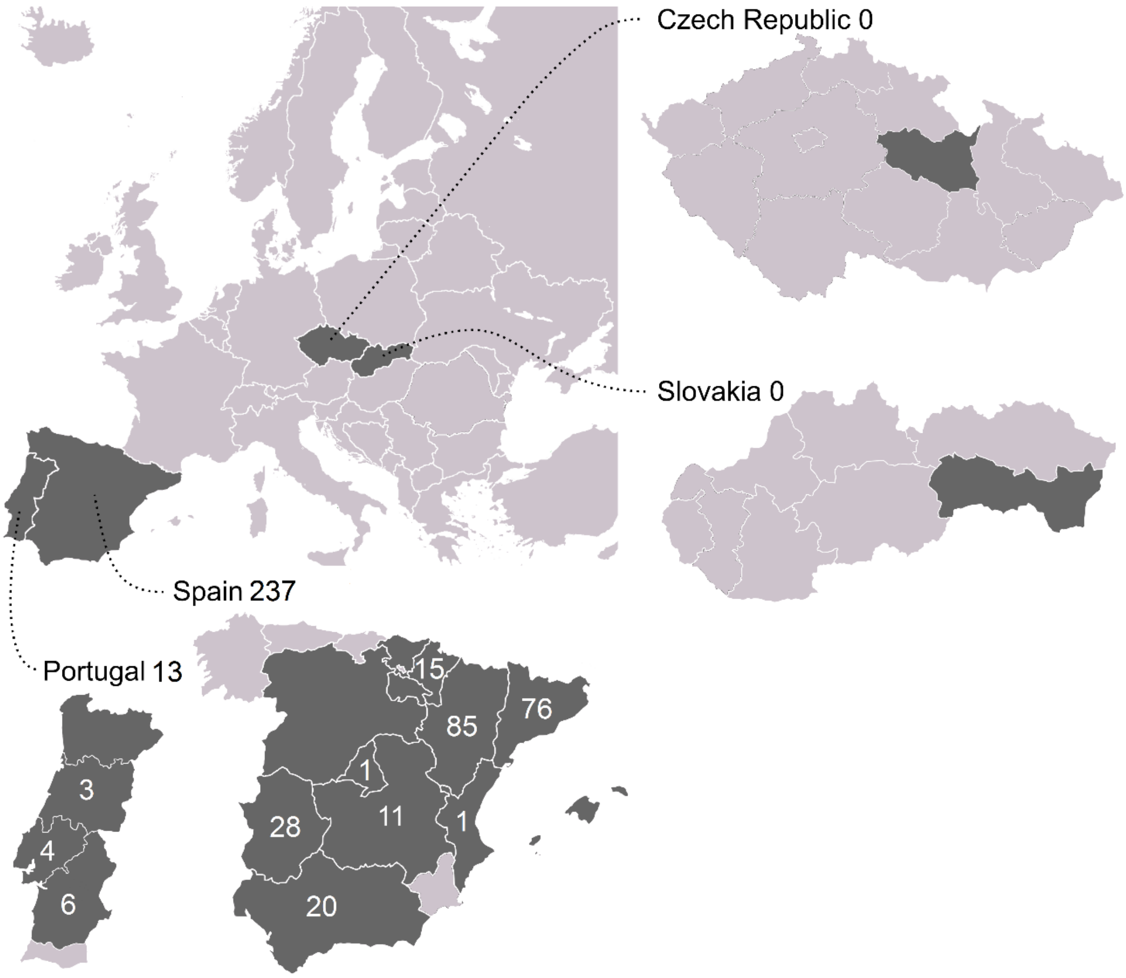

Figure 7: Number of sampling sites within the cultivation areas (dark grey) of MON 810 in Europe in 2016

3.2.2 Surrounding environment

The farmers were asked to describe the land usage in the surrounding of the areas planted with maize. All fields (100 %) are surrounded by farmland (Table 13, Figure 8).

Table 13: Land usage in the surrounding of the areas planted with MON 810 in Europe in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	Farmland	250	100.0	100.0	100.0
Total		250	100.0	100.0	

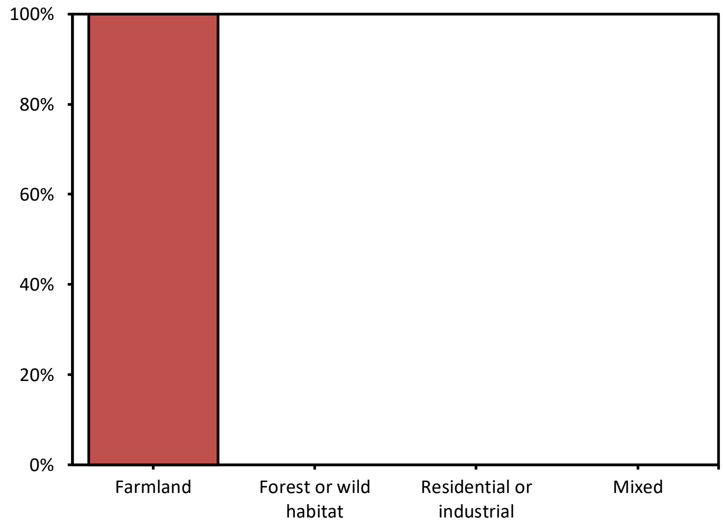

Figure 8: Land usage in the surrounding of the areas planted with MON 810 in Europe in 2016

3.2.3 Size and number of fields of the maize cultivated area

The size of the total maize area at the farms in 2016 ranged from 1 to 700 hectares. The average MON 810 areas per surveyed farmer in 2016 were 28.6 ha in Spain and 79.0 ha in Portugal. Details for cultivation of maize between 2006 and 2016 by country can be found in Table 14.

Table 14: 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	2,500.0	433.8	89.3	1,400.0	431.9	57.4	3,000.0	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	1,300.0	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	1,110.0	239.5	20.0	1,130.0	256.1	4.8	1,470.0	-	-	-
	MON 810	17.3	1.0	50.0	43.0	0.5	166.0	51.6	0.2	200.0	-	-	-
Romania	all maize	-	-	-	1,969.8	253.0	5,616.0	591.4	5.4	6,789.0	417.5	2.5	6,869.0
	MON 810	-	-	-	61.4	0.5	216.0	149.0	2.0	2,705.0	62.1	1.0	1,114.0
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 14 (cont): Maize area (ha) per surveyed farmer in 2010, 2011, 2012 and 2013

		2010			2011			2012			2013		
Country	**Total Area (ha)**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Mean**	**Min**	**Mean**	**Min**	**Mean**	**Min**	**Max**
Spain	all maize	34.2	2.0	34.2	2.0	34.2	2.0	33.0	1.0	320.0	41.6	1.5	1,000.0
	MON 810	23.9	1.0	23.9	1.0	23.9	1.0	21.8	1.0	278.0	27.7	1.0	700.0
France	all maize	-	-	-	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	all maize	78.4	9.0	78.4	9.0	78.4	9.0	96.7	10.0	300.0	103.7	10.0	537.0
	MON 810	53.9	1.5	53.9	1.5	53.9	1.5	61.5	1.5	240.0	58.4	1.0	240.0
Czech Republic	all maize	355.7	2.2	355.7	2.2	355.7	2.2	492.2	8.4	2,000.0	454.0	9.3	1,300.0
	MON 810	112.7	2.0	112.7	2.0	112.7	2.0	108.6	6.6	230.0	95.8	7.3	250.0
Slovakia	all maize	594.9	150.0	594.9	150.0	594.9	150.0	862.9	862.9	862.9	-	-	-
	MON 810	184.2	60.0	184.2	60.0	184.2	60.0	169.0	169.0	169.0	-	-	-
Germany	all maize	-	-	-	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-	-	-	-
Romania	all maize	196.9	20.0	196.9	20.0	196.9	20.0	124.0	20.0	500.0	749.0	548.0	950.0
	MON 810	32.9	0.1	32.9	0.1	32.9	0.1	21.6	0.0	59.3	227.8	55.6	400.0
Poland	all maize	61.1	19.0	61.1	19.0	61.1	19.0	-	-	-	-	-	-
	MON 810	23.8	1.5	23.8	1.5	23.8	1.5	-	-	-	-	-	-

Table 14 (cont): Maize area (ha) per surveyed farmer in 2014, 2015 and 2016

		2014			2015			2016		
Country	Total Area (ha)	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Spain	all maize	53.0	2.0	1,950.0	40.7	1.0	579	40.9	1.0	700
	MON 810	34.0	1.0	1,445.0	25.8	0.9	400	28.6	1.0	600
France	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Portugal	all maize	111.7	10.0	800.0	109.6	10.0	728	120.8	37.0	180
	MON 810	64.3	1.0	640.0	66.3	1.0	582	79.0	10.0	136
Czech Republic	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Slovakia	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Germany	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Romania	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-
Poland	all maize	-	-	-	-	-	-	-	-	-
	MON 810	-	-	-	-	-	-	-	-	-

Figure 9 shows the mean percentage of MON 810 cultivation area within total maize area per farmer from 2006 to 2017.

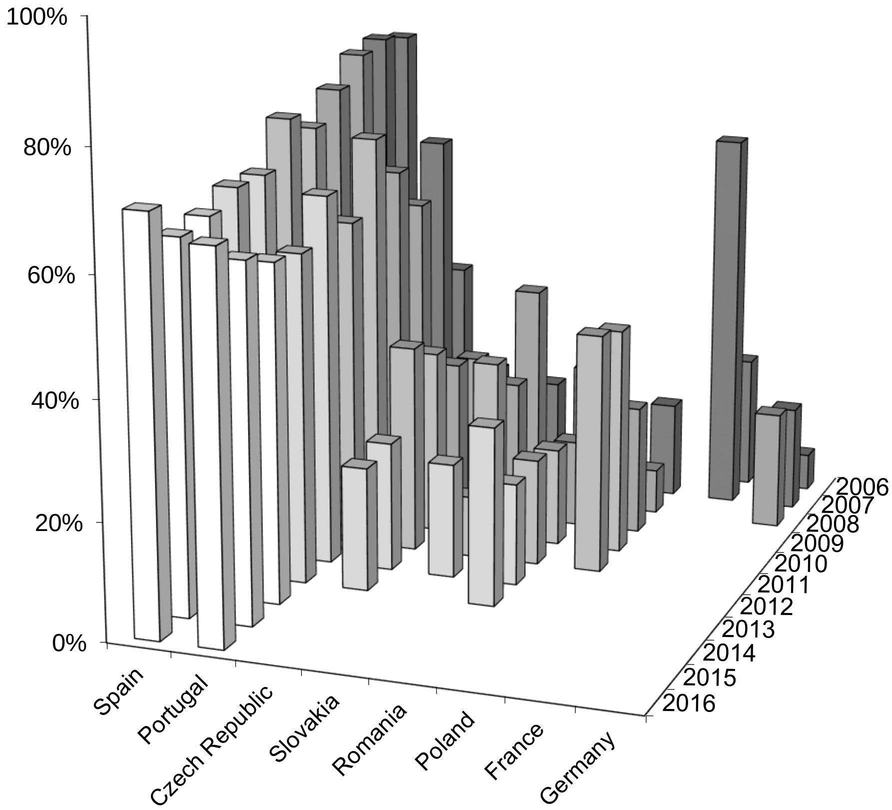

Figure 9: Mean percentage of MON 810 cultivation area of total maize area per farmer in 2006 - 2016 (surveyed countries only)

In 2016, MON 810 was cultivated on 1 - 100 fields per farm. On average every farmer cultivated MON 810 on 5-6 fields (Table 15).

Table 15: Number of fields with MON 810 in 2016

Valid N	Mean	Minimum	Maximum	Sum
250	5.79	1	100	1447

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 they cultivated on their farm in 2016. 45 different MON 810 varieties and 50 different conventional maize varieties were listed. The most frequently listed varieties (at least 6 times) together with their respective frequencies are listed in Table 16.

Table 16: Names of most cultivated MON 810 and conventional maize varieties in 2016

MON 810 maize		Conventional maize	
Variety	Frequency	Variety	Frequency
DKC 6729 YG	78	DKC 6728	60
P 1921 Y	46	P 1921	31
P 1758 Y	42	P 1758	22
P 1570 Y	30	P 1570	15
P 1574 Y	25	P 1574	14
DKC 5277 YG	18	DKC 6630	12
DKC 6631 YG	17	P 1524	11
P 0725 Y	15	P 0725	10
PR 33 Y 72	14	P 0933	10
PR 33 W 86	12	DKC 6450	6
P 0222 Y	11	DKC 5276	6
DKC 5032 YG	10		
DKC 6451 YG	9		
LG 30690 YG	9		
P 0933 Y	8		
LG 30490 YG	7		
DKC 6041 YG	6		
Kayras YG	6		
MAS 65 YG	6		
P 0837 Y	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 humus content were surveyed. Table 17 summarizes the reported soil types of the maize grown area.

Table 17: Predominant soil type of maize grown area in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	very fine	5	2.0	2.0	2.0
	fine	53	21.2	21.2	23.2
	medium	121	48.4	48.4	71.6
	medium-fine	33	13.2	13.2	84.8
	coarse	12	4.8	4.8	89.6
	no predominant soil type	26	10.4	10.4	100.0
Total		250	100.0	100.0	

Farmers' responses regarding the soil quality of the maize-grown areas are given in Table 18 and Figure 10. 97.2 % (243/250) of the maize was grown on $normal$ or $good$ soil according to the response of the farmers.

Table 18: Soil quality of the maize grown area as assessed by the farmers in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	below average - poor	7	2.8	2.8	2.8
	average - normal	187	74.8	74.8	77.6
	above average - good	56	22.4	22.4	100.0
Total		250	100.0	100.0	

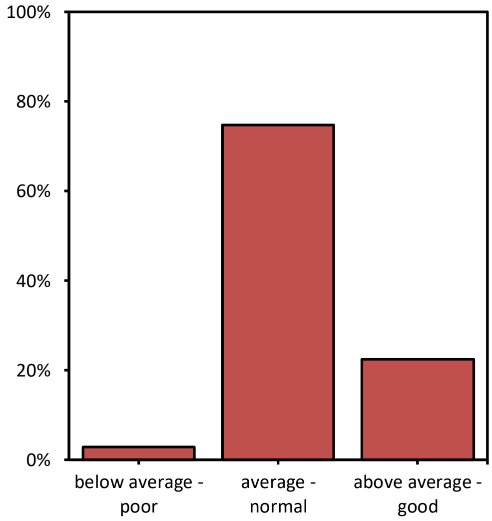

Figure 10: Soil quality of the maize grown area as assessed by the farmers in 2016

76 farmers were able to specify the humus content (not a commonly known measure all over Europe), which ranged from 1.0 % to 3.0 % with a mean of 1.9 % (Table 19). 174 farmers (all from Spain) did not specify the humus content.

Table 19: Humus content (%) in 2016

Valid N	Mean	Minimum	Maximum	Missing N
76	1.9	1	3	174

3.2.6 Local disease, pest and weed pressure in maize

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

3.2.6.1 Local disease pressure (fungal, viral) as assessed by the farmers

The local disease pressure (fungal, viral) in maize was assessed to be low or $as\ usual$ by 95.6 % (239/250) of the farmers (Table 20, Figure 11).

In Spain 55.3 % (131/237) found the local disease pressure to be low and 40.1 % (95/237) stated it to be $as\ usual$, in Portugal 100.0 % (13/13) found it low.

Table 20: Farmers assessment of the local disease pressure (fungal, viral) in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	144	57.6	57.6	57.6
	as usual	95	38.0	38.0	95.6
	high	11	4.4	4.4	100.0
Total		250	100.0	100.0	

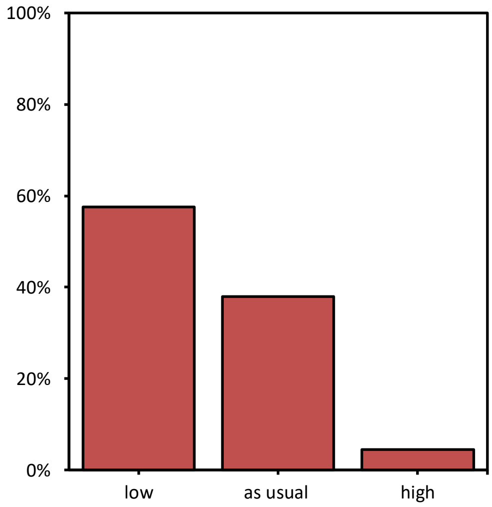

Figure 11: Farmers assessment of the local disease pressure (fungal, viral) in 2016

3.2.6.2 Local pest pressure (insects, mites, nematodes) as assessed by the farmers

Regarding the local pest pressure (insects, mites, nematodes), 92.4 % (231/250) of the farmers evaluated it to be low or $as\ usual$ and 7.6 % (19/250) evaluated it to be $high$ (Table 21, Figure 12). In Spain 54.0 % (128/237) of the farmers evaluated the local pest pressure to be low and 40.0 % to be $as\ usual$, in Portugal 92.3 % (12/13) evaluated it to be low, all 19 farmers stating $high$ local pest pressure came from Spain.

Table 21: Farmers assessment of the local pest pressure (insects, mites, nematodes) in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	140	56.0	56.0	56.0
	as usual	91	36.4	36.4	92.4
	high	19	7.6	7.6	100.0
Total		250	100.0	100.0	

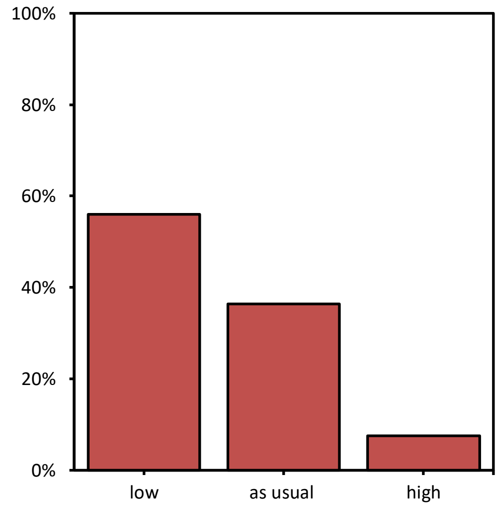

Figure 12: Farmers assessment of the local pest pressure (insects, mites, nematodes) in 2016

3.2.6.3 Local weed pressure as assessed by the farmers

94.0 % (235/250) assessed the local weed pressure to be low or $as\ usual$ and 5.6 % (14/250) evaluated it to be $high$ (Table 22, Figure 13).

Table 22: Farmers assessment of the local weed pressure in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	low	49	19.6	19.7	19.7
	as usual	186	74.4	74.7	94.4
	high	14	5.6	5.6	100.0
	Total	249	99.6	100.0	
Missing	no statement	1	0.4		
Total		250	100.0		

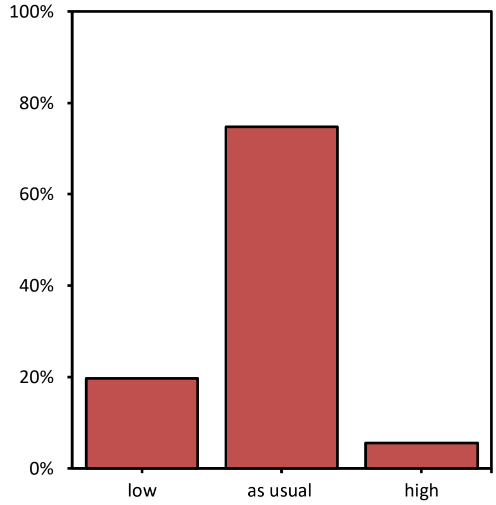

Figure 13: Farmers assessment of the local weed pressure in 2016

3.3 Part 2: Typical agronomic practices to grow maize

3.3.1 Irrigation of maize grown area

100 % (250/250) irrigated their fields (Table 23). The irrigation of the maize grown area is a productivity factor. These data reflect the general practices on the Iberian Peninsula. The irrigation depends on the weather conditions, even though it could be relevant for the analysis of GM maize specific effects.

Table 23: Irrigation of maize grown area in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	250	100.0	100.0	100.0
	no	0	0.0	0.0	100.0
Total		250	100.0	100.0	

Most of the irrigating farmers used Gravity (40.8 %) or by Sprinkler (40.8 %) followed by Pivot (8.8 %). Some of them used more than one of the named or other types of irrigation (Table 24).

In Spain, Gravity (101/237) and Sprinkler (102/237) were the most common irrigation methods, while farmers in Portugal mostly used Pivot (10/13).

Table 24: Irrigation of maize grown area in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	Gravity	102	40.8	40.8	40.8
	Sprinkler	102	40.8	40.8	81.6
	Pivot	22	8.8	8.8	90.4
	other	19	7.6	7.6	98.0
	Gravity and Sprinkler	1	0.4	0.4	98.4
	Sprinkler and Pivot	3	1.2	1.2	99.6
	Pivot and other	1	0.4	0.4	100.0
Total		250	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 $maize - cereals - maize$ and $cereals - maize - maize$. More crop rotations were mentioned, but all with low occurrence (Table 25).

Table 25: Major rotation of maize grown area before 2016 planting season (two years ago and previous year) sorted by frequency

	two years ago	previous year	Frequency	Percentage	Valid percentage	Accumulated percentage
Valid	maize	maize	105	43.4	43.4	43.4
	maize	cereals	35	14.5	14.5	57.9
	cereals	maize	30	12.4	12.4	70.2
	maize	legumes	10	4.1	4.1	74.4
	legumes	legumes	10	4.1	4.1	78.5
	maize	cotton	10	4.1	4.1	82.6
	legumes	maize	9	3.7	3.7	86.4
	maize	vegetables	6	2.5	2.5	88.8
	legumes	cereals	5	2.1	2.1	90.9
	cotton	maize	3	1.2	1.2	92.1
	vegetables	maize	2	0.8	0.8	93.0
	vegetables	cereals	2	0.8	0.8	93.8
	maize	other oil plants	2	0.8	0.8	94.6
	legumes	no cultivation	2	0.8	0.8	95.5
	cereals	cotton	2	0.8	0.8	96.3
	maize	potato	2	0.8	0.8	97.1
	other oil plants	maize	1	0.4	0.4	97.5
	other oil plants	cereals	1	0.4	0.4	97.9
	sugar beet	cereals	1	0.4	0.4	98.3
	vegetables	legumes	1	0.4	0.4	98.8
	cotton	other oil plants	1	0.4	0.4	99.2
	cereals	vegetables	1	0.4	0.4	99.6
	vegetables	vegetables	1	0.4	0.4	100.0
Total			242	100.0	100.0	

3.3.3 Soil tillage practices

The farmers were asked to answer whether they performed soil tillage. 97.2 % (243/250) said yes (Table 26) while 2.8 % 7/250) answered no. The 7 farmers who answered no came from Spain.

Table 26: Soil tillage practices in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	243	97.2	97.2	97.2
	no	7	2.8	2.8	100.0
Total		250	100.0	100.0	

All farmers who said yes specified the time of tillage. 75.3 % (183/250) performed it in $winter$, 24.7 % (60/250) in $spring$ and no one in $winter\ and\ spring$ (Table 27, Figure 14). In Portugal, all 13 farmers stated that they performed soil tillage during $spring$.

Table 27: Time of tillage in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	winter	183	75.3	75.3	75.3
	spring	60	24.7	24.7	100.0
	winter & spring	0	0.0	0.0	100.0
Total		243	100.0	100.0	

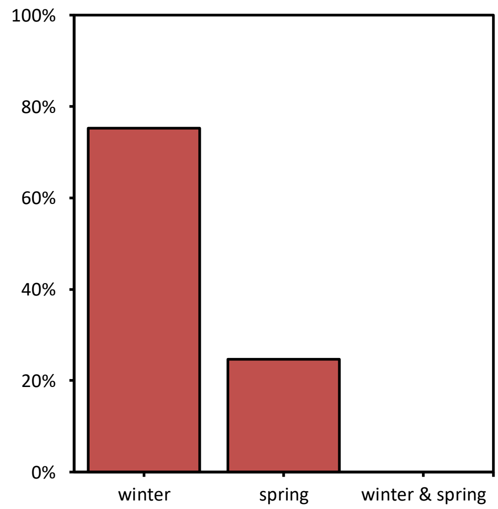

Figure 14: Time of tillage in 2016

3.3.4 Maize planting technique

91.2 % (228/250) of the farmers used *conventional* maize planting techniques, 6.0 % (15/250) *mulch* and 2.8 % (7/250) used *direct sowing* (Table 28, Figure 15).

Table 28: Maize planting technique in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	conventional planting	228	91.2	91.2	91.2
	mulch	15	6.0	6.0	97.2
	direct sowing	7	2.8	2.8	100.0
Total		250	100.0	100.0	

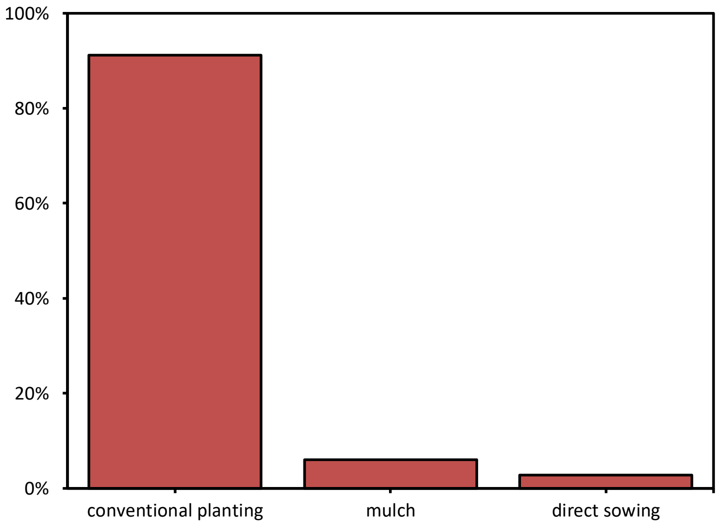

Figure 15: Maize planting technique in 2016

3.3.5 Typical weed and pest control practices in maize

Farmers were asked to specify the typical weed and pest control practices for maize at their farms. For conventional maize 97.6 % of all farmers (244/250) applied *insecticides* and 9.0 % (22/244) of them additionally applied *insecticides against corn borers*. 99.6% of the farmers (249/250) used *herbicides*, 10.0% (25/250) used *mechanical weed control* or *fungicides*. None of the farmers used *biocontrol treatment* (Table 29).

Table 29: Typical weed and pest control practices in maize in 2016

Insecticide(s)		Frequency	Percent
	yes	244	97.6
	no	6	2.4
Total		250	100.0
Insecticide(s) against Corn Borer		Frequency	Percent
	yes	22	8.8
	no	222	88.8
	Total	244	
Missing	no statement	6	2.4
Total		250	100.0
Use of biocontrol treatments		Frequency	Percent
	yes	0	0.0
	no	250	100.0
Total		250	100.0
Herbicide(s)		Frequency	Percent
	yes	249	99.6
	no	1	0.4
Total		250	100.0
Mechanical weed control		Frequency	Percent
	yes	25	10.0
	no	225	90.0
Total		250	100.0
Fungicide(s)		Frequency	Percent
	yes	0	0.0
	no	250	100.0
Total		250	100.0
Other		Frequency	Percent
	yes	0	0.0
	no	250	100.0
Total		250	100.0

3.3.6 Application of fertilizer to maize grown area

99.6% of the farmers (249/250) applied fertilizer to the maize grown area (Table 30).

Table 30: Application of fertilizer to maize grown area in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	249	99.6	99.6	99.6
	no	1	0.4	0.4	100.0
Total		250	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 01 March 2016 to 15 July 2016 (Table 31).

Table 31: Typical time of maize sowing in 2016

	Minimum	Maximum	Mean	Valid N
Sowing from	01.03.2016	25.06.2016	09.04.2016	250
Sowing till	10.03.2016	15.07.2016	05.05.2016	250

3.3.8 Typical time of maize harvest

In order to verify the plausibility of the data, farmers were also asked for their typical time of harvest. The time of harvest for maize grain ranged from 25 July 2016 to 10 February 2017 and for maize forage from 25 July 2016 to 20 December 2016 (Table 32).

Table 32: Typical time of maize harvest in 2016

	Minimum	Maximum	Mean	Valid N
Harvest grain maize from	25.07.2016	01.02.2017	15.10.2016	248
Harvest grain maize till	10.08.2016	10.02.2017	10.11.2016	248
Harvest forage maize from	25.07.2016	20.11.2016	26.09.2016	14
Harvest forage maize till	10.08.2016	20.12.2016	11.10.2016	14

3.4 Part 3: Observations of MON 810

3.4.1 Agricultural practice for MON 810 (compared to conventional maize)

3.4.1.1 Crop rotation

The crop rotation for MON 810 was specified to be $as\,usual$ in 98.4 % (246/250) of the cases (Appendix A Table A 1, Table 33, Figure 16). The individual specifications for $changed$ crop rotation before MON 810 are given in Appendix A, Table A 1.

Table 33: Crop rotation for MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	246	98.4	98.4	98.4
	changed	4	1.6	1.6	100.0
Total		250	100.0	100.0	

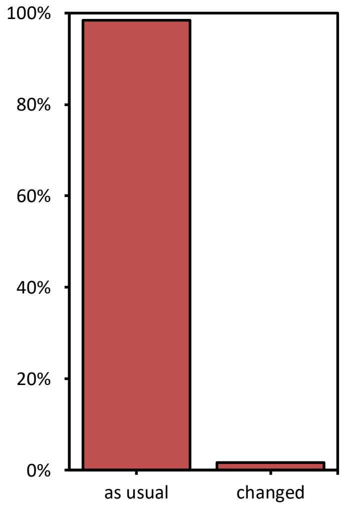

Figure 16: Crop rotation of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\,usual$ crop rotation (98.4 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 34) and therefore, the null hypothesis $p_{as\,usual} \leq 0.9$ is rejected with a power of 100.0 %.

No effect on crop rotation is indicated.

Table 34: Test results as well as 99% confidence intervals for $p_{As\,usual}$, p_{Minus} and p_{Plus} probabilities of crop rotation in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	246 (98.4%)	< 0.01				

$p_{As\,usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
98.4%	96.4%	100.4%	-	-	-	1.6%	0.0%	3.64%

3.4.1.2 Time of planting

The time of planting of MON 810 was specified to be $as\ usual$ compared to conventional maize by 97.6 % (244/250) of the farmers (Table 35, Figure 17). The individual specifications for $later$ and $earlier$ planting of MON 810 are given in Appendix A, Table A 2.

Table 35: Time of planting for MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	earlier	2	0.8	0.8	0.8
	as usual	244	97.6	97.6	98.4
	later	4	1.6	1.6	100.0
Total		250	100.0	100.0	

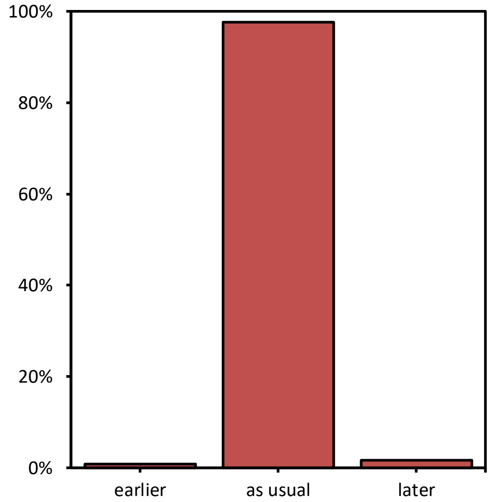

Figure 17: Time of planting of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ time of planting (97.6 %) is significantly greater than 90 % at the level of significance $\alpha = 0.01$ (Table 36) and therefore, the null hypothesis $p_{as\ usual} \leq 0.9$ is rejected with a power of 100% .

No effect on time of planting is indicated.

Table 36: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of time of planting in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	244 (97.6%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
97.6%	95.1%	100.1%	0.8%	0.0%	2.3%	1.6%	0.0%	3.6%

3.4.1.3 Tillage and planting techniques

The majority of the farmers did not change the tillage and planting techniques of MON 810 compared to those used for conventional maize, as reflected in Table 37 and Figure 18. Only 3 farmers (1.2 %; all from Spain) indicated a change. The individual specifications for *changed* tillage and planting techniques of MON 810 are given in Appendix A,Table A 3.

Table 37: Tillage and planting techniques for MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	247	98.8	98.8	98.8
	changed	3	1.2	1.2	100.0
Total		250	100.0	100.0	

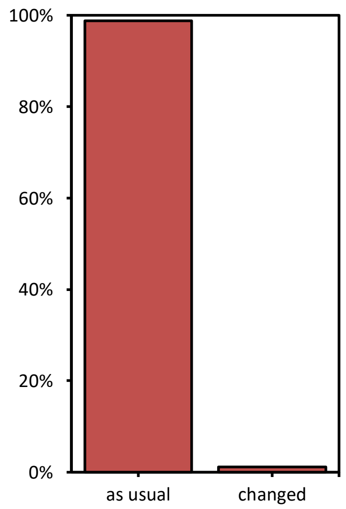

Figure 18: Tillage and planting techniques of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ tillage and planting techniques (98.8 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 38) and therefore, the null hypothesis $p_{as\ usual} \leq 0.9$ is rejected with a power of 100 %.

No effect on tillage and planting techniques is indicated.

Table 38: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of tillage and planting techniques in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
260	247 (98.8%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
98.8%	97.0%	100.6%	-	-	-	1.2%	0.0%	3.0%

3.4.1.4 Insect and corn borer control practice

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, for which Thiacloprid was the major active ingredient in 2016. Abamectin and Chlorpyrifos were the most used active ingredients for spraying. Furthermore, Chlorpyrifos, Lambda-cyhalothrin or Teflutrin were the active ingredients of all named granulate insecticides.

All farmers were asked to describe their insect control practice in MON 810 compared to conventional maize in 2015. 92.4 % (231/250) specified no change in practice, while 7.6 % (19/250) used a $different$ program Table 39, Figure 19).

Table 39: Use of insect control in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	231	92.4	92.4	92.4
	changed	19	7.6	7.6	100.0
Total		250	100.0	100.0	

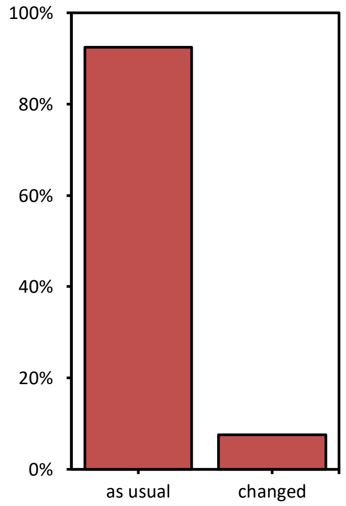

Figure 19: Insect control practice of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ insect control practice (92.4 %) is not significantly greater than 90 % at the level of significance $\alpha = 0.01$ (Table 40) and therefore, the null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected. The lower 99 %-confidence interval limit is 88.1 %, the upper limit is 96.7 %.

(2) The valid percentage of $changed$ insect control practice (7.6 %) is smaller than 10 %. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 40) and therefore, the null hypothesis $p_{changed} \geq 0.1$ is not rejected.

An effect on insect control practice is indicated.

Table 40: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of insect control practice in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	231 (92.4%) 0.081	231			19 (7.6%)	0.121

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
92.4%	88.1%	96.7%	-	-	-	7.6%	3.3%	11.9%

All farmers that stated a difference in their insect control practices compared to conventional maize (Table 41) said that they specifically changed their corn borer control practice, as it is not necessary in MON 810 (Table 42, Figure 20). All individual explanations are given in Appendix A, Table A 5.

Table 41: Insect control practice compared to conventional maize in the context of the general use of insecticides in 2016

		Insect control practice in MON 810		
		as usual	changed	Total
Do you usually use insecticides? (section 3.3.5)	yes	225	19	244
	no	6	0	6
Total		231	19	250

Table 42: Corn Borer control practice compared to conventional maize in the context of the general use of insecticides against Corn Borer in 2016

		Corn borer control practice in MON 810		
		as usual	changed	Total
Do you usually use insecticides specifically against corn borer? (section 3.3.5)	yes	3	19	22
	no	222	0	222
no statement		3	6	0
Total		225	19	250

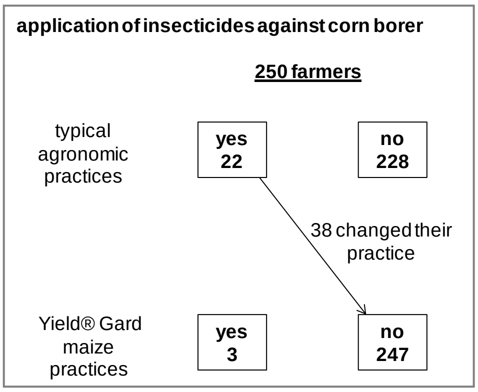

Figure 20: Change of insect control practice in MON 810 compared to conventional maize in 2016

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.

3.4.1.5 Weed control practice

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:

- (S)-Metolachlor
- Mesotrione
- Nicosulfuron
- Isoxaflutole
- Dicamba
- Fluroxypyr
- Foramsulfuron
- Aclonifen
- Isoxadifen-ethyl

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

The farmers were asked to describe their weed control practice in MON 810 in 2016 compared to conventional maize. All farmers (100 %) used the same weed control in MON 810 compared to conventional maize (Table 43).

Table 43: Use of weed control in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	250	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		250	100.0	100.0	

No effect on weed control practice is indicated.

3.4.1.6 Fungal control practice

Since in 2016 no farmer declared to use a fungicide, no statement about the most common active ingredient in fungicides can be made.

No farmer did change the fungicide program of MON 810 compared to that of conventional maize (Table 44).

No effect on fungal control practice is indicated.

Table 44: Use of fungicides on MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	250	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		250	100.0	100.0	

3.4.1.7 Fertilizer application practice

All farmers answered the question regarding the fertilizer application in MON 810. No farmer used a *changed* program (Table 45).

Table 45: Use of fertilizer in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	250	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		250	100.0	100.0	

No effect on fertilizer application practice is indicated.

3.4.1.8 Irrigation practice

All farmers answered the question regarding the irrigation practice in MON 810, 1 farmer *changed* the practice (Table 46, explanation: YieldGard - flood irrigation, conventional maize - sprinkler irrigation) .

Table 46: Irrigation practice in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	249	99.6	99.6	99.6
	changed	1	0.4	0.4	100.0
Total		250	100.0	100.0	

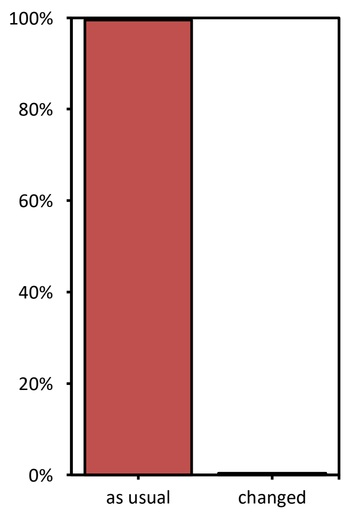

Figure 21: Irrigation practice of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ irrigation practice (99.6 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 47) and therefore, the null hypothesis $p_{as\ usual} \leq 0.9$ is rejected with a power of 100 %.

No effect on irrigation practice is indicated.

Table 47: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of Irrigation practice in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	249 (99.6 %)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
99.6%	98.6%	100.6%	-	-	-	0.4%	0.0%	1.4%

3.4.1.9 Harvest of MON 810

The farmers were asked whether they harvested MON 810 earlier or later than conventional maize or as usual. 245 of them (98.0 %) responded that no change in harvesting date was applied for MON 810. Only 2.0 % (5/250) stated that they harvested MON 810 $later$ and no farmer (0.0 %) harvested $earlier$ (Table 48, Figure 22). When asked for the reason for a $later$ harvest of MON 810, most farmer said that it maturates later. The complete individual feedback of the farmers for a changed harvesting time is given in Appendix A, Table A 7.

Table 48: Harvest of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	earlier	0	0.0	0.0	0.0
	as usual	245	98.0	98.0	98.0
	later	5	2.0	2.0	100.0
Total		250	100.0	100.0	

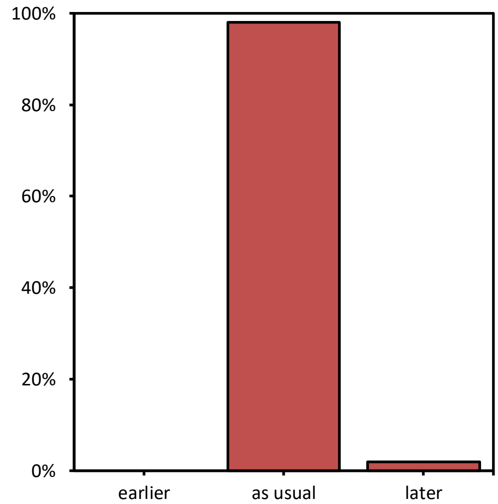

Figure 22: Harvest of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ harvest (98.0 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 49) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could be rejected with a power of 100 %.

No effect on the harvest time is indicated.

Table 49: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of harvesting time in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	245 (98.0%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
98.0%	95.7%	100.3%	0.0%	0.0%	0.0%	2.0%	0.0%	4.3%

<u>Assessment of differences in agricultural practice in MON 810 (compared to conventional maize)</u>

Agricultural practices in MON 810 (compared to conventional maize) were not changed in terms of time of crop rotation, time of planting or harvest, tillage and planting techniques, weed control practice, fungal control practice, fertilizer application practice and irrigation practice. The one difference found refers to the insect and corn borer control practice of MON 810.

This difference in insect and corn borer control practice arises from farmers not controlling corn borers with conventional insecticide applications, because MON 810 is specifically designed to control corn borers as *Ostrinia nubilalis* and *Sesamia* spp. Furthermore, fewer 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)

3.4.2.1 Germination vigour

While 8.4 % (21/250) of all farmers assessed the germination of MON 810 to be $more\ vigorous$, 91.2 % (228/250) found it to be $as\ usual$ and one farmer (0.4 %) found MON 810 to be $less\ vigorous$ (Table 50, Figure 23). Out of the 21 farmers who claimed the germination to be $more\ vigorous$, 12 came from Portugal. The one farmer who assessed the MON 810 to be less vigorous came from Spain. Most of these farmers made high field sanitation of Yieldgard maize accountable for the increased vigour. Individual explanations for the observations of the farmers are given in Appendix A, Table A 8.

Table 50: Germination of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less vigorous	1	0.4	0.4	0.4
	as usual	228	91.2	91.2	91.6
	more vigorous	21	8.4	8.4	100.0
Total		250	100.0	100.0	100.0

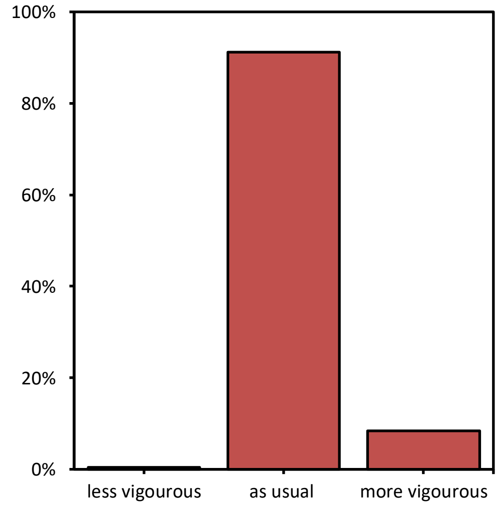

Figure 23: Harvest of MON 810 compared to conventional maize in 2016

(1) The valid percentage for $as\ usual$ germination (91.2 %) is not significantly greater than 90 % at the level of significance $\alpha = 0.01$ (Table 51), *i.e.* the null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected. The lower 99 % confidence interval limit is 86.6 %, the upper limit is 95.8 %.

(2) The valid percentage of $less\ vigorous$ germination (0.4 %) does not exceed the 10 % threshold. The P-value does not exceed the level of significance $\alpha = 0.01$ (Table 51), *i.e.* the null hypothesis for $p_{less\ vigorous} \geq 0.1$ could be rejected with a power of 100 %.

The valid percentage for $more\ vigorous$ germination (8.4 %) does not exceed the 10 % threshold, but the P-value exceeds the level of significance $\alpha = 0.01$ (Table 51), *i.e.* the null hypothesis for

$p_{more\ vigorous} \geq 0.1$ is not rejected. The lower 99 % confidence interval limit is 3.9 %, the upper limit is 12.9 %.

An effect on the germination vigor is indicated.

Table 51: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of germination vigour in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	228 (91.2 %)	0.234	1 (0.4 %)	< 0.01	21 (8.4 %)	0.234

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
91.2%	86.6%	95.8%	0.4%	0.0%	1.4%	8.4%	3.9%	12.9%

3.4.2.2 Time to emergence

95.2 % (238/250) of the farmers found the time to emergence to be *as usual*, 4.0 % (10/250) assessed the time to emergence to be *accelerated* and 2 farmers to be *delayed* (Table 52, Figure 24). The individual explanation for this observation is given in Appendix A, Table A 8.

Table 52: Time to emergence of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	10	4.0	4.0	4.0
	as usual	238	95.2	95.2	99.2
	delayed	2	0.8	0.8	100.0
Total		250	100.0	100.0	

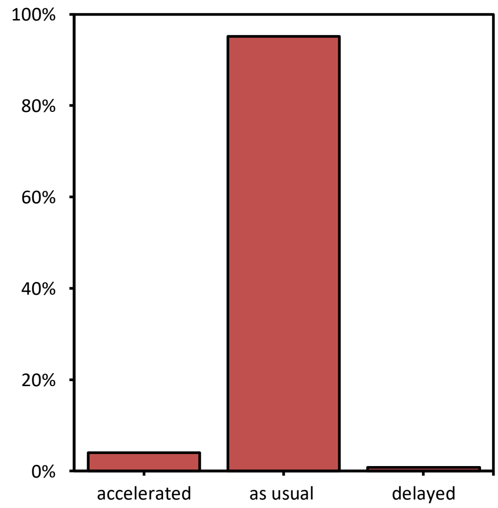

Figure 24: Time to emergence of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ time to emergence (95.2 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 53) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could be rejected with a power of 100 %.

No effect on the time to emergence is indicated.

Table 53: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of time to emergence in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	238 (95.2%)	< 0.01	10 (4.0%)	< 0.01	2 (0.8%)	< 0.01

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
95.2%	91.7%	98.7%	4,0%	0.8%	7.2%	0.8%	0.0%	2.3%

3.4.2.3 Time to male flowering

99.2% (248/250) of the farmers assessed the time to male flowering to be $as\ usual$, only 2 farmers (0.8 %) assessed the time to male flowering to be $accelerated$ (Table 54, Figure 25). Individual explanations for these observations are given in Appendix A, Table A 8.

Table 54: Time to male flowering of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	2	0.8	0.8	0.8
	as usual	248	99.2	99.2	100.0
	delayed	0	0.0	0.0	100.0
Total		250	100.0	100.0	

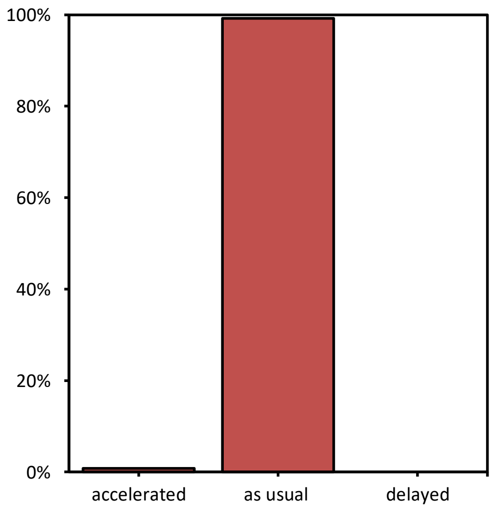

Figure 25: Time to male flowering of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ time to male flowering (99.2 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 55) and therefore, the null hypothesis $p_{as\ usual} \leq 0.9$ is rejected with a power of 100 %.

No effect on time to male flowering is indicated.

Table 55: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of time of male flowering in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	248 (99.2%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
99.2%	97.7%	100.7%	0,8%	0.0%	2.3%	0.0%	0.0%	0.0%

3.4.2.4 Plant growth and development

Plant growth and development was assessed to be $delayed$ in 0.4 % (1/250), $accelerated$ in 2.0 % (5/250), and to be $as\ usual$ in 97.6 % (244/250) of all cases (Table 56, Figure 26). Individual explanations for these observations are given in Appendix A, Table A 8.

Table 56: Plant growth and development of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	5	2.0	2.0	2.0
	as usual	244	97.6	97.6	99.6
	delayed	1	0.4	0.4	100.0
Total		250	100.0	100.0	

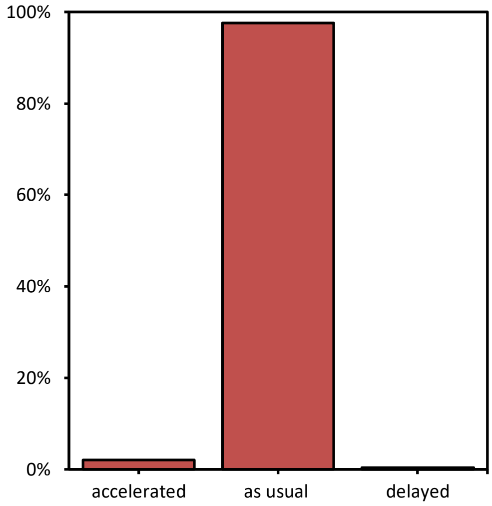

Figure 26: Plant growth and development of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ plant growth and development (97.6 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 57) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could be rejected with a power of 100 %.

No effect on plant growth and development is indicated.

Table 57: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of plant growth and development in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	244 (97.6%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
97.6%	95.1%	100.1%	2.0%	0.0%	4.3%	0.4%	0.0%	1.4%

3.4.2.5 Incidence of stalk/root lodging

Incidence of stalk/root lodging was assessed to be $less$ in MON 810 compared to conventional maize in 33.2 % (83/250) of all cases and $as\ usual$ in 66.8 % (167/25) (Table 58, Figure 27). All 83 farmers who claimed the incidence of stalk/root lodging to be $less$ came from Spain. Individual explanations for these observations are given in Appendix A, Table A 8.

Table 58: Incidence of stalk/root lodging of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less often	83	33.2	33.2	33.2
	as usual	167	66.8	66.8	100.0
	more often	0	0.0	0.0	100.0
Total		250	100.0	100.0	

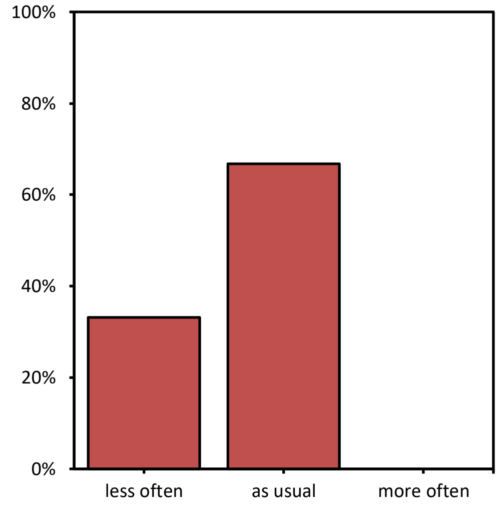

Figure 27: Incidence of stalk/root lodging of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ incidence of stalk/root lodging (66.8 %) is less than 90 %. The resulting P-value is larger than the level of significance $\alpha = 0.01$ (Table 59) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected. The lower 99 % confidence interval limit is 59.1 %, the upper limit is 74.5 %.

(2) The valid percentage of $less$ incidence of stalk/root lodging (33.2 %) does exceed the 10 % threshold. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 59) and therefore, the corresponding null hypothesis $p_{less\ often} \geq 0.1$ could not be rejected. The lower 99 % confidence interval limit is 25.5 %, the upper limit is 40.9 %.

The valid percentage of $more$ incidence of stalk/ root lodging (0.0 %) is significantly smaller than 10 % (Table 59) *i.e.* the null hypothesis for $p_{more\ often} \geq 0.1$ could be rejected with a power of 100 %.

An effect on the incidence of stalk/root lodging of MON 810 is indicated.

Table 59: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of incidence of stalk/root lodging in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	167 (66.8%)	1.0	83 (33.2%)	1.0	0 (0.0 %)	< 0.01

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
66.8%	59.1%	74.5%	33.2%	25.5%	40.9%	0.0%	0.0%	0.0%

3.4.2.6 Time to maturity

14.8 % (37/259; all 37 from Spain) of the farmers assessed the time to maturity to be $delayed$ for MON 810 (Table 60, Figure 28). Individual explanations for these observations are given in Appendix A, Table A 8.

Table 60: Time to maturity of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	accelerated	0	0.0	0.0	0.0
	as usual	213	85.2	85.2	85.2
	delayed	37	14.8	14.8	100.0
Total		250	100.0	100.0	

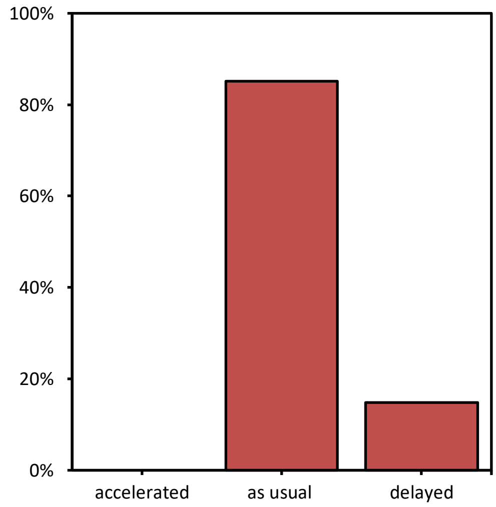

Figure 28: Time to maturity of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ time to maturity (85.2 %) is not significantly greater than 90 % at the level of significance $\alpha = 0.01$ (Table 61) and the null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected. The lower 99 % confidence interval limit is 79.4 %, the upper limit is 91.0 %.

(2) The valid percentage of $accelerated$ time to maturity (0.0 %) is significantly smaller than 10 % (Table 61) *i.e.* the null hypothesis for $p_{accelerated} \geq 0.1$ could be rejected with a power of 100 %.

The valid percentage of $delayed$ time to maturity (14.8 %) is greater than the 10 % threshold. The resulting P-value is greater than level of significance $\alpha = 0.01$ (Table 61) and therefore, the corresponding null hypothesis $p_{delayed} \geq 0.1$ could not be rejected. The lower 99 % confidence interval limit is 9.0 %, the upper limit is 20.6 %.

An effect on the time to maturity of MON 810 is indicated.

Table 61: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of time to maturity in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	213 (85.2%)	0.99	0 (0.0 %)	< 0.01	37 (14.8%)	1.0

$p_{As\,usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
85.2%	79.4%	91.0%	0.0%	0.0%	0.0%	14.8%	9.0%	20.6%

3.4.2.7 Yield

Yield was $higher$ in 46.7 % (117/250) of all cases (Table 62, Figure 29). Individual explanations for these observations are given in Appendix A, Table A 8.

Table 62: Yield of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	lower yield	1	0.4	0.4	0.4
	as usual	132	52.8	52.8	53.2
	higher yield	117	46.8	46.8	100.0
Total		250	100-0	100.0	

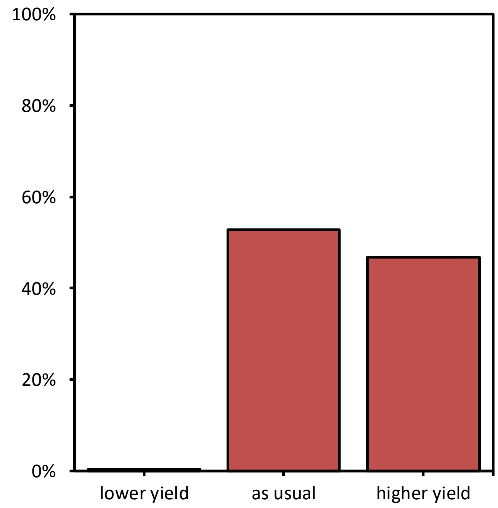

Figure 29: Yield of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\,usual$ yield (52.8 %) is smaller than 90 %. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 63) and therefore, the corresponding null hypothesis $p_{as\,usual} \leq 0.9$ could not be rejected. The lower confidence interval limit is 44.7 %, the upper limit is 60.9 %.

(2) The valid percentage of $lower$ yield (0.4 %) is significantly smaller than the 10 % threshold. The resulting P-value is smaller than the level of significance $\alpha = 0.01$ (Table 63) and therefore, the corresponding null hypothesis $p_{lower\,yield} \geq 0.1$ could be rejected with a power of 100 %.

The valid percentage of $higher$ yield (46.8 %) exceeds the 10 % threshold. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 63) and therefore, the corresponding null hypothesis $p_{higher\ yield} \geq 0.1$ could not be rejected. The lower confidence interval limit is 38.7 %, the upper limit is 54.9 %.

An effect on yield of MON 810 is indicated.

Table 63: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of yield in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	132 (52.8%)	1.0	1 (0.4%)	< 0.01	117 (46.8%)	1.0

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
58.8%	44.7%	60.9%	0.4%	0.0%	1.4%	46.8%	38.7%	54.9%

3.4.2.8 Occurrence of volunteers

The occurrence of volunteers was assessed to be $less$ frequent for MON 810 than for conventional maize in 11.6 % (29/250) and $as\ usual$ in 88.4 % (221/250) of all cases (Table 64, Figure 30). Individual explanations for these observations are given in Appendix A, Table A 8.

Table 64: Occurrence of MON 810 volunteers compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less often	29	11.6	11.6	11.6
	as usual	221	88.4	88.4	100.0
	more often	0	0.0	0.0	100.0
Total		250	100.0	100.0	

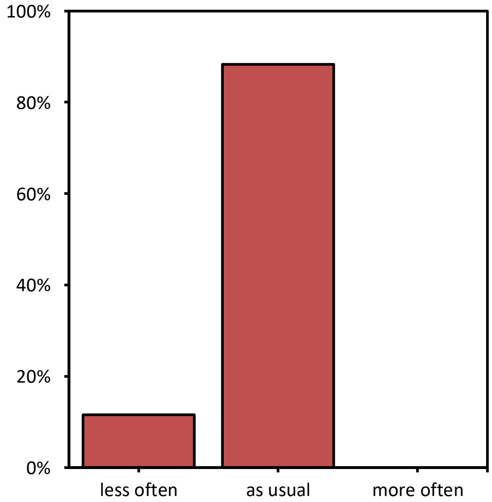

Figure 30: Occurrence of MON 810 volunteers compared to conventional maize in 2016

(1) The valid percentage of $as\,usual$ occurrence of volunteers (88.4 %) is smaller than 90 %. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 65) and therefore, the corresponding null hypothesis $p_{as\,usual} \leq 0.9$ could not be rejected.

(2) The valid percentage of $less$ volunteers (11.6 %) is larger than the 10 % threshold. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 65) and therefore, the corresponding null hypothesis $p_{lower\,yield} \geq 0.1$ could not be rejected. The lower confidence interval limit is 6.4 %, the upper limit is 16.8 %.

The valid percentage of $more$ volunteers (0.0 %) is significantly smaller than the 10 % threshold. The resulting P-value is smaller than the level of significance $\alpha = 0.01$ (Table 65) and therefore, the corresponding null hypothesis $p_{higher\,yield} \geq 0.1$ could be rejected with a power of 100%.

An effect on occurrence of MON 810 volunteers is indicated.

Table 65: Test results as well as 99% confidence intervals for $p_{As\,usual}$, p_{Minus} and p_{Plus} probabilities of occurrence of volunteers in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	221 (88.4%)	0.774	28 (11.6%)	0.830	0 (0.0%)	< 0.01

$p_{As\,usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
88.4%	83.2%	93.6%	11.6%	6.4%	16.8%	0.0%	0.0%	0.0%

<u>Assessment of differences in the characteristics of MON 810 in the field (compared to conventional maize)</u>

The results for the characteristics of MON 810 in the field compared to conventional maize can be summarized as follows

- more vigourous germination,
- an unchanged time to emergence,
- an unchanged time to male flowering,
- an unchanged plant growth and development,
- a less frequent incidence of stalk/root lodging,
- a delayed time to maturity,
- a higher yield and
- a less often occurrence rate of volunteers.

These results underline the substantial equivalence of MON 810 to comparable conventional lines, as evidenced by recent genomic and proteomic analyses [Coll, 2008]; [Coll, 2009]; [Coll, 2010]; [Coll, 2011].

The more vigourous germination is likely associated with the quality of the germplasm.

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 be explained similarly. Therefore, differences in these parameters are anticipated and only underline the effectiveness of corn borer control.

The longer time to maturity can also be assigned as 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 14.8 % of farmers. The low percentage indicates that this phenomenon is restricted to areas of pest pressure.

All additional observations during plant growth are listed in Appendix A, Table A 9.

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

Farmers assessed MON 810 to be $less\ susceptible$ to diseases in 6.8 % (17/260) of the time (Table 66, Figure 31).

Table 66: Disease susceptibility in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less susceptible	17	6.8	6.8	6.8
	as usual	233	93.2	93.2	100.0
	more susceptible	0	0.0	0.0	100.0
Total		250	100.0	100.0	

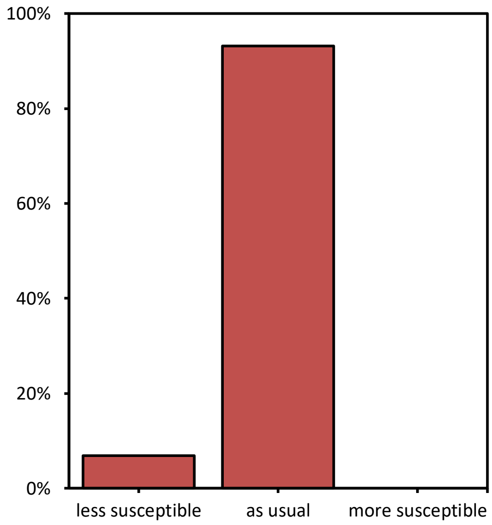

Figure 31: Disease susceptibility of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ disease susceptibility (93.8 %) is greater than 90 %. but the resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 67) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected.

(2) The valid percentage of $less$ susceptibility (6.8 %) is smaller than the 10 % threshold but the resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 67) and therefore, the corresponding null hypothesis $p_{lower\ yield} \geq 0.1$ could not be rejected. The lower confidence interval limit is 2.7 %, the upper limit is 10.9 %.

The valid percentage of $more$ susceptibility (0.0 %) is significantly smaller than the 10 % threshold. The resulting P-value is smaller than the level of significance $\alpha = 0.01$ (Table 67) and therefore, the corresponding null hypothesis $p_{higher\ yield} \geq 0.1$ could be rejected with a power of 100%.

An effect on disease susceptibility is indicated.

Table 67: Test results as well as 99% confidence intervals for $p_{As\,usual}$, p_{Minus} and p_{Plus} probabilities of disease susceptibility in MON 810 compared to conventional maize in 2016

N valid	As usual	P for $p_0 = 0.9$	Minus	P for $p_0 = 0.1$	Plus	P for $p_0 = 0.1$
250	233 (93.2%)	0.031	17 (6.8%)	0.051	0 (0.0%)	< 0.01

$p_{As\,usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
93.2%	89.1%	97.3%	6.8%	2.7%	10.9%	0.0%	0.0%	0.0%

The 17 farmers that answered different from $as\ usual$ were asked to specify the difference in disease susceptibility by listing the diseases with an explanation. Table 68 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 attributed to a lower susceptibility to *Fusariosis* (3.6 %, 9/250), *Sphacelotheca reiliana (2.8 %, 7/250), Ustilago maydis* (1.6 %, 4/250), *Hongos generos fusarium (1.2 %, 3/250), Cephalosporium spp.* (0.8 %, 2/250) and *MDMV or MRDV* viruses (0.4 %, 1/250).

Table 68: Specification of differences in disease susceptibility in MON 810 compared to conventional maize in 2016

Group	Species	More	Less
Fungus	*Fusariosis*	0	9
	Sphacelotheca reiliana	0	7
	Ustilago maydis	0	4
	Hongos generos fusarium	0	3
	Cephalosporium spp.	0	2
Virus	*MDMV or MRDV*	0	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 farmers reported less disease susceptibility to some fungal species, specified as *Ustilago maydis, Sphacelotheca reiliana* spp., *Fusarium* spp., *Hongos generos fusarium* and *Cephalosporium spp.,* as well as the viruses *MDMV or MRDV*.

The finding of supposedly less disease susceptible MON 810 varieties is not surprising, as it has been well established that feeding holes and tunnels of the corn borer serve as entry points for secondary fungal infections, especially for *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, 1999]; [Dowd, 2000];

[Bakan, 2002]; [Hammond, 2003]; [Wu, 2006]. The farmers' testimonies (Appendix A, Table A 10) corroborate the findings from above.

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

The insect pest control of *O. nubilalis* (European corn borer) was assessed to be *very good* or *good* in 100.0 % (250/250) of the cases (Table 69, Figure 32).

Table 69: Insect pest control of *O. nubilalis* in MON 810 in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	weak	0	0.0	0.0	0.0
	good	12	4.8	4.8	4.8
	very good	238	95.2	95.2	100.0
Total		250	100.0	100.0	

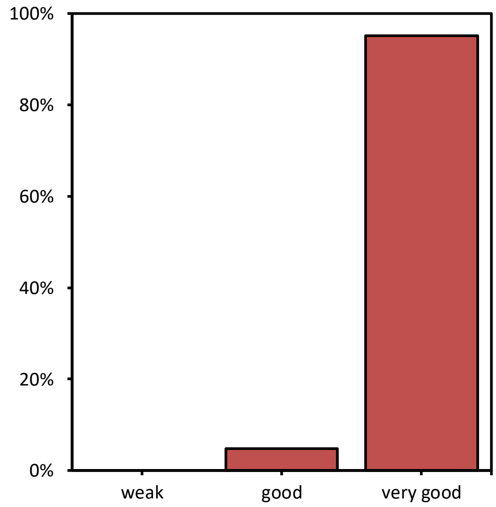

Figure 32: Insect pest control of *Ostrinia nubilalis* in MON 810 in 2016

100.0 % (250/250) of the farmers who gave a valid answer attested a *good* or *very good* control of *Sesamia* spp. (Pink Borer) (Table 70, Figure 33).

Table 70: Insect pest control of *Sesamia* spp. in MON 810 in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	weak	0	0.0	0.0	0.0
	good	12	4.8	4.8	4.8
	very good	238	95.2	95.2	100.0
Total		250	100.0	100.0	

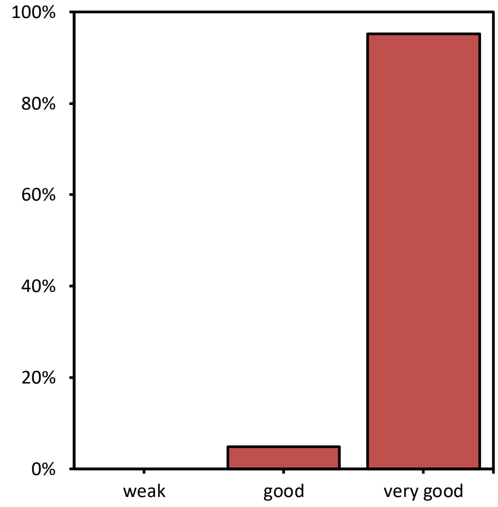

Figure 33: Insect pest control of *Sesa mia* spp. in MON 810 in 2016

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 12.8 % (32/250) of all cases (Table 71, Figure 34).

Table 71: Pest susceptibility of MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less susceptible	32	12.8	12.8	12.8
	as usual	218	87.2	87.2	100.0
	more susceptible	0	0.0	0.0	100.0
Total		250	100.0	100.0	

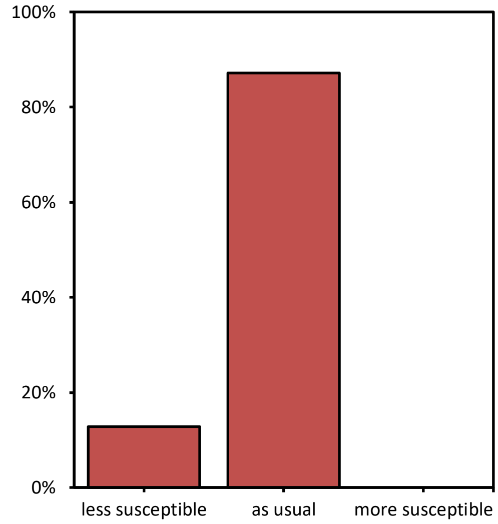

Figure 34: Pest susceptibility of MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ pest susceptibility (87.2 %) is less than 90 %. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 72) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could not be rejected. The lower 99 % confidence interval limit is 81.8 %, the upper limit is 92.6 %.

(2) The valid percentage of lower pest susceptibility (12.8 %) exceeds the 10 % threshold. The resulting P-value is greater than the level of significance $\alpha = 0.01$ (Table 72) and therefore, the corresponding null hypothesis $p_{less\ susceptible} \geq 0.1$ could not be rejected.

The valid percentage of higher pest susceptibility (0.0 %) does not exceed the 10 % threshold and the resulting P-value is smaller than the level of significance $\alpha = 0.01$ (Table 72), *i.e.* the null hypothesis $p_{more\ susceptible} \geq 0.1$ could be rejected with a power of 100 %.

An effect on pest susceptibility is indicated.

Table 72: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of pest susceptibility in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	218 (87.2%)	0.911	32 (12.8%)	0.9389	0 (0.0 %)	< 0.01

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
87.2%	81.8%	92.6%	12.8%	7.4%	28.4%	0.0%	0.0%	0.0%

The 32 farmers that answered different from *as usual* were asked to specify the observed difference in pest susceptibility by listing respective pests with an explanation. Table 73 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 73: Specification of differences in pest susceptibility in MON 810 compared to conventional maize in 2016

Order	Name	N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
Lepidoptera	*Agrotis ipsilon*	250	237 (94.8 %)	< 0.01	13 (5.2 %)			
	Spodoptera frugiperda	250	238 (95.2 %)	< 0.01	12 (4.8 %)			
	Mythimna spp. *(Mitima)*	250	247 (98.8 %)	< 0.01	3 (1.2 %)			
	Spodoptera exigua	250	247 (98.8 %)	< 0.01	3 (1.2 %)			
	Heliothis	250	242 (96.8 %)	< 0.01	8 (3.2 %)			
Arachnida	Red Spider	250	244 (95.8 %)	< 0.01	6 (2.4 %)			
Cleoptera	*Agriotes* spp.	250	246 (98.4 %)	< 0.01	4 (1.6 %)			
Hemiptera	Aphids	250	247 (98.8 %)	< 0.01	3 (1.2 %)			

What becomes clear in Table 73 is that for all listed pests

(1) the valid percentages of $as\ usual$ pest susceptibility in MON 810 compared to conventional maize in 2016 are greater than 90 % and the resulting P-value is smaller than the level of significance $\alpha = 0.01$.Therefore, the corresponding null hypotheses $p_{as\ usual} \leq 0.9$ could be rejected with a power of 77 %, 85 %, 99 %, 100 %, 100 %, 100 %, 100% and 100 % for *Agrotis ipsilon, Spodoptera frugiperda, Mythimna* spp.*, Spodoptera exigua*, *Heliothis,* Red Spider, *Agriotes* spp. and Aphids, respectively.

No effect of those pests is indicated.

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 slightly reduced.

The reduced susceptibility of MON 810 to Lepidoptera is not surprising, given the numerous scientific studies of 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 it specifically has toxic properties [Marvier, 2007]; [Wolfenbarger, 2008]. The monitoring data thus corroborate the conclusions drawn during the environmental risk assessment and ongoing research.

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

All except one farmer (249/250) found the weed pressure to be $as\ usual$ in MON 810 fields compared to conventional fields (Table 74, Figure 35). Explanation: "*YieldGard has more vegetation, gives more shade and there are less presence of weeds than in Conventional maize*".

Table 74: Weed pressure in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less weeds	1	0.4	0.4	0.4
	as usual	249	99.6	99.6	100.0
	more weeds	0	0.0	0.0	100.0
Total		250	100.0	100.0	

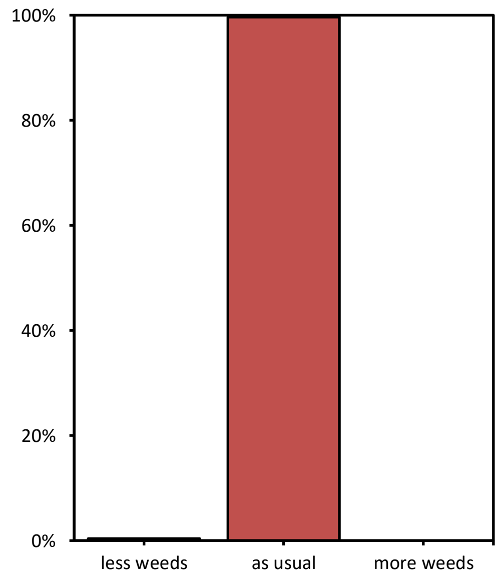

Figure 35: Weed pressure in MON 810 compared to conventional maize in 2016

(1) The valid percentage of $as\ usual$ weed pressure (99.6 %) is significantly greater than 90 %. The resulting P-value is less than the level of significance $\alpha = 0.01$ (Table 75) and therefore, the corresponding null hypothesis $p_{as\ usual} \leq 0.9$ could be rejected with a power of 100 %.

No effect on weed pressure is indicated.

Table 75: Test results as well as 99% confidence intervals for $p_{As\ usual}$, p_{Minus} and p_{Plus} probabilities of plant growth and development in MON 810 compared to conventional maize in 2016

N valid	*As usual*	*P* for $p_0 = 0.9$	*Minus*	*P* for $p_0 = 0.1$	*Plus*	*P* for $p_0 = 0.1$
250	249 (99.6%)	< 0.01				

$p_{As\ usual}$	lower 99 % confidence limit	upper 99 % confidence limit	p_{Minus}	lower 99 % confidence limit	upper 99 % confidence limit	p_{Plus}	lower 99 % confidence limit	upper 99 % confidence limit
99.6%	98.6%	100.6%	0.4%	0.0%	1.4%	0.0%	0.0%	0.0%

The farmers were asked to name the three most abundant weeds in their MON 810 fields. Weeds that were listed more than 30 times are:

- *Sorghum halepense*
- *Abutilon theophrasti*
- *Chenopodium album*
- *Cyperus spp.*
- *Amaranthus retroflexus*
- *Datura stramonium*
- *Echinochloa spp.*
- *Xanthium strumarium*
- *Setaria spp.*
- *Digitaria sanguinalis*
- *Solanum nigrum*

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 as 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)

3.4.7.1 Occurrence of non target insects

Farmers assessed the occurrence of non target insects in MON 810 fields to be *as usual* in 100 % (250/250) of all cases (Table 76).

Table 76: Occurrence of non target insects in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	0	0.0	0.0	0.0
	as usual	250	100.0	100.0	100.0
	more	0	0.0	0.0	100.0
Total		250	100.0	100.0	

3.4.7.2 Occurrence of birds

99.6 % of the farmers (249/250) assessed the occurrence of birds in MON 810 fields to be *as usual* (Table 77).

Table 77: Occurrence of birds in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	1	0.4	0.4	0.4
	as usual	249	99.6	99.6	100.0
	more	0	0.0	0.0	100.0
Total		250	100.0	100.0	

3.4.7.3 Occurrence of mammals

99.6 % of the farmers (249/250) assessed the occurrence of mammals in MON 810 fields to be *as usual* (Table 78).

Table 78: Occurrence of mammals in MON 810 compared to conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	less	1	0.4	0.4	0.4
	as usual	249	99.6	99.6	100.0
	more	0	0.0	0.0	100.0
Total		250	100.0	100.0	

The one farmer who assessed the occurrence of birds and mammals to be less, gave the follwing explanation: "*Because there is less maize on the ground to feed, in the conventional maize there are more birds because more corn grains falls to the ground.*"

<u>Assessment of differences in occurrence of wildlife in MON 810 fields (compared to conventional maize)</u>

The occurrence of wildlife in MON 810 is reported to be unchanged for non target insects, birds and mammals. No farmers stated that they found a changed number of wildlife animals.

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 fields is limited. Studies have shown that no impact on mammals caused by the consumption of MON 810 is to be expected [Shimada, 2003]; [Shimada, 2006a]; [Shimada, 2006b]; [Stumpff, 2007]; [Bondzio, 2008].

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

2.0 % (5/250) of the farmers used the harvest of MON 810 to feed their animals (Table 79). These data reflect only the range of feeding; it is assumed that only farmers that cultivate silage maize feed them to their livestock. That could explain why only 2.0 % of the surveyed farmers fed MON 810, however, there are no strong data supporting this assumption.

Table 79: Use of MON 810 harvest for animal feed in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	5	2.0	2.0	2.0
	no	245	98.0	98.0	100.0
Total		250	100.0	100.0	

Out of the 5 farmers who did feed the harvest of MON 810 to their animals, 100 % (5/5) found the performance of them to be *as usual* when compared to the animals fed with conventional maize (Table 80).

Table 80: Performance of the animals fed MON 810 compared to the animals fed conventional maize in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	as usual	5	100.0	100.0	100.0
	changed	0	0.0	0.0	100.0
Total		5	100.0	100.0	

No effect on the performance of animals fed with MON 810 is indicated.

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

No farmer found a difference in performance of animals fed with MON 810.

3.4.9 Any additional remarks or observations

In the 2016 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

99.6 % (249/250) of the farmers reported to have been informed about the good agricultural practices applicable to MON 810 (Table 81).

94.0 % (235/250) of the farmers considered the training sessions to be either $useful$ or $very\ useful$ (Table 82). This information indicates that the great majority of the farmers had been exposed to a valuable training concerning MON 810.

Table 81: Information on good agricultural practices in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	249	99.6	99.6	99.6
	no	1	0.4	0.4	100.0
Total		250	100.0	100.0	

Table 82: Evaluation of training sessions in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	very useful	103	41.2	41.4	41.4
	useful	132	52.8	53.0	94.4
	not useful	14	5.6	5.6	100.0
Total		250	100,0	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 99.2 % (248/250) of the 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 (92.4 %) reported that they are following the label recommendations on the seed bags (Table 83). 19 farmers from Spain (7.6 %) admitted that they did not follow the label recommendations. All of these farmers explained that they did not plant a refugee. Deviations from the label recommendations are listed in Appendix A, Table A 14.

Table 83: Compliance with label recommendations in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	231	92.4	92.4	92.4
	no	19	7.6	7.6	100.0
	Total	250	100.0	100.0	
Missing	no statement	0	0.0		
Total		250	100.0		

3.5.3 Prevention of insect resistance

70.8 % (177/250) did plant a refuge within their farms or were part of “production areas” in Portugal and comply collectively with this requirement (Table 84, Table A 15). Additionally, 21.2 % (53/250) of the farmers did not plant a refuge because they had less than 5 ha of MON 810 maize planted on their farm (the Insect Resistance Management Plan states that no refuge is required if less than 5 hectares of *Bt* maize are planted). 8.0 % (20/250) of the farmers reported that they did not plant a refuge although having more than 5 ha of maize planted on their farm.

Table 84: Planting of a refuge in 2016

		Frequency	Percent	Valid percentages	Accumulated percentages
Valid	yes	177	70.8	70.8	70.8
	no, because the surface of *Bt* maize is < 5 ha	53	21.2	21.2	92.0
	no	20	8.0	8.0	100.0
Total		250	100.0	100.0	

Therefore, 92.0 % (230/250) of the farmers followed the label recommendations.

All cases of not planting a refuge because of a *Bt* maize planted area < 5 ha occurred in Spain (Table 85).

Table 85: Refuge implementation per country in 2016

		Refuge implementation			
	Country	Yes	No, because the area of *Bt* maize is < 5 ha	No	Total
Valid	Spain	164	53	20	237
	Portugal	13	0	0	13
Total		177	53	20	250

As a result of the continuous and intensive training of farmers with regards to implementing a refuge, the overall compliance is again high this year. In Spain 8.4 % (20/237) of the farmers who were required to did not plant a refuge, for which two main reasons were given. The first reason was that the farmer had no or not enough information about the technical guidelines and feared the yield losses in conventional maize (10/20, 50.0 %), the second reason was that neighbors' refuge was taken to be sufficient or the refuge was smaller than 20% od MON 810 area (7/20, 35.0 %). the third reason was that the sowing is complicated by planting a refuge (3/20, 15.0 %). All individual reasons for not planting a refuge are listed in Appendix A, Table A 15. Four farmers in Portugal reported they had not planted individual refuge because they were part of a “production area” and the group of farmers who are members of that production area had organized to ensure refuge compliance. These two cases were integrated in the compliant group because they comply collectively with the refuge requirements as indicated in the Portuguese regulation.

4 Conclusions

The analysis of 250 questionnaires from a survey of farmers cultivating MON 810 in 2016 in the two main MON 810 cultivating European countries, Spain and Portgal, did not reveal unexpected adverse effects that could be associated with maize hybrids containing 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 2016 conditions.

The statistically significant effects reported in Part 3 were neither unexpected nor adverse. The corresponding observations 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 2016 growing seasons. Currently, the database contains data of 2 877 valid questionnaires. As shown in Table 86 and Table 87 the frequency patterns of farmers' answers in 2016 are very similar to those of the previous years. In general the same effects have been observed.

After eleven years of farmer questionnaires, no unexpected (adverse) effects have been indicated. Compared to the cultivation practices in conventional maize, farmers use nearly the same practices for cultivating MON 810. The abscence of damage caused by corn borers on the MON 810 plants renders the plants healthier and provides related benefits to the farmers.

In contrast to the data of the monitoring characters, the data of the influencing factors differ between the years.

Table 86: Overview on the frequency of $Minus^4$ answers of the monitoring characters in 2006 - 2016 in percent [%]. Grey-colored boxes mark cases where Hypothesis (2a) $H_0: p_{Minus} \geq 0.1$ could not be rejected.

Monitoring character[1]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Time of planting	1.6	3.4	2.7	2.9	1.8	1.2	0.0	0.0	0.4	0.4	0.8
Time of harvest	2.4	3.8	3.4	2.1	2.2	0.4	0.0	0.0	0.4	0.0	0.0
Germination vigor	6.0	4.1	1.7	0.8	0.0	0.0	0.4	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	0.0	0.0	0.4	4.0
Time to male flowering	0.4	1.7	4.7	2.1	3.7	0.0	0.8	0.8	0.0	0.0	0.8
Plant growth and development	6.5	6.9	9.8	5.9	7.0	0.8	1.6	1.2	0.0	1.1	2.0
Incidence of stalk / root lodging	58.9	36.2	38.6	31.9	35.1	24.5	28.1	17.2	26.8	27.2	33.2
Time to maturity	2.0	4.8	4.3	2.9	4.1	0.0	0.0	0.0	0.0	0.0	0.0
Yield	2.4	3.9	4.4	1.7	1.8	0.0	2.4	2.0	1.5	0.0	0.4
Occurrence of volunteers	33.9	8.4	11.1	10.8	8.2	6.9	4.2	4.0	1.1	3.8	11.6
Disease susceptibility	36.1	21.7	34.7	29.3	25.6	19.7	17.3	12.5	5.4	4.2	6.8
Pest susceptibility	11.1	5.9	18.5	17.2	18.6	17.7	21.3	18.0	16.1	21.8	12.8
Weed pressure	0.4	2.1	1.7	2.1	4.8	0.0	0.0	0.0	0.0	0.0	0.4
Occurrence of wildlife[3]	2.9	6.1	7.7	-	-	-	-	-	-	-	
Occurrence of insects[2]	-	-	-	0.9	0.8	0.9	0.0	0.0	0.0	0.0	0.0
Occurrence of birds[2]	-	-	-	0.4	1.2	0.4	0.0	0.0	0.4	0.0	0.4
Occurrence of mammals[2]	-	-	-	0.9	1.1	0.4	0.4	0.4	0.4	0.0	0.4

[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 87: Overview on the frequency of $Plus$[5] answers of the monitoring characters in 2006 - 2016 in percent [%]. Grey-colored boxes mark cases where Hypothesis (2b) $H_0: p_{Plus} \geq 0.1$ could not be rejected.

Monitoring Character[1]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Crop rotation[2]	-	-	-	0.8	1.8	0.8	4.4	5.9	3.8	6.5	1.6
Time of planting	6.0	3.8	2.7	1.3	4.1	1.6	3.6	5.1	4.2	6.5	1.6
Tillage and planting technique	0.0	0.7	0.0	0.4	0.4	0.0	2.0	2.0	3.1	3.5	1.2
Insect control practices	48.0	11.9	22.2	18.3	16.2	24.9	17.3	16.4	16.5	14.6	7.6
Corn borer control practice[3]	-	-	9.8	22.9	15.5	22.9	18.1	16.0	16.1	14.2	7.2
Weed control practices	0.4	0.3	0.3	0.0	0.4	0.0	0.0	0.0	1.9	0.0	0.0
Fungal control practices	0.0	1.1	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fertilizer Application	0.8	0.3	0.0	0.4	0.4	0.0	0.0	2.3	0.4	0.0	0.0
Irrigation Practices	1.6	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4
Time of harvest	24.1	18.6	13.8	7.9	6.6	4.4	4.0	5.1	4.6	4.2	2.0
Germination vigor	8.0	6.9	11.4	14.6	16.2	5.6	5.6	7.4	11.9	13.0	8.4
Time to emergence	5.6	3.8	2.0	0.8	0.4	0.0	0.4	0.4	0.0	0.0	0.8
Time to male flowering	1.6	7.7	3.7	1.7	2.6	2.0	1.2	0.4	0.4	0.0	0.0
Plant growth and development	1.6	4.8	2.7	2.1	3.7	0.8	2.0	0.8	0.0	0.4	0.4
Incidence of stalk / root lodging	1.6	0.3	0.3	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Time to maturity	30.9	25.9	24.0	14.6	16.2	12.9	16.1	12.5	11.5	6.1	14.8
Yield	68.7	44.8	52.7	56.9	49.8	43.4	43.0	34.8	36.0	50.6	46.8
Occurrence of volunteers	0.0	1.7	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.4	0.0
Disease susceptibility	2.0	1.0	0.7	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Pest susceptibility	1.2	1.4	0.7	1.3	0.0	0.0	0.4	0.4	0.4	0.0	0.0
Weed pressure	0.0	0.3	0.3	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.0
Occurrence of wildlife[4]	2.1	2.9	2.4	-	-	-	-	-	-	-	
Occurrence of insects[2]	-	-	-	0.9	0.4	0.4	0.0	0.0	0.0	0.0	0.0
Occurrence of birds[2]	-	-	-	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Occurrence of mammals[2]	-	-	-	1.3	1.1	0.4	0.0	0.0	0.0	0.0	0.0
Performance of animals	0.0	6.7	4.9	8.9	12.3	10.5	10.3	7.7	0.0	0.0	0.0

[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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List of abbreviations

GM	genetically modified
GMO	genetically modified organism
GMP	genetically modified plant
PMEM	post-market environmental monitoring

List of tables

List of figures

6 Annex A Tables of free entries

Table A 1: Specifications for *changed* crop rotation before planting MON 810 (Section 3.4.1.1)

Country	Quest. Nr.	Crop rotation	Comments
Spain	4652	changed	I plant YieldGard after watermelon and Conventional maize after cotton.
Spain	4776		I plant YieldGard after barley and Conventional maize after maize.
Spain	4822		I plant YieldGard after barley and Conventional maize after maize.
Spain	4830		The YieldGard I plant it after barley and the Conventional maize after maize.

Table A 2: Specifications for different time of planting of MON 810 (Section 3.4.1.2)

Country	Quest. Nr.	Time of planting	Comments aggregate	Comments
Spain	4720	earlier	short-/ long cycle	YieldGard is of longer-cycle than Conventional maize.
Spain	4874			YieldGard is of longer-cycle than Conventional maize.
Spain	4751	later		I planted before the Conventional maize because it has longer-cycle than YieldGard.
Spain	4776			YieldGard is of short-cycle and Conventional maize is of long-cycle.
Spain	4822			YieldGard is of short-cycle and I plant it after Conventional maize which is of long-cycle.
Spain	4830			YieldGard is of short-cycle and the Conventional maize is of long-cycle.

Table A 3: Specifications for $changed$ tillage and planting technique of MON 810 (Section 3.4.1.3)

Country	Quest. Nr.	Tillage and planting technique	Comments aggregate	Comments
Spain	4776	changed	YieldGard - Direct Drilling, Conventional - Tillage.	In YieldGard I do direct seeding and in the Conventional maize I do minimun tillage.
Spain	4822			I plant YieldGard in direct seeding and the Conventional maize with conventional seeding.
Spain	4830			I do direct seeding in YieldGard and conventional seeding in the Conventional maize.

Table A 4: Insecticides applied in MON 810 (Section 3.4.1.4) differentiated by their use

Active Ingredient	Insecticide as cited by the Farmer	Spain	Portugal	Total
Seed Treatment				
Thiacloprid	Sondio	186	13	199
	Total	186	13	**199**
Sprayed				
Abamectin	Apache, Bersite, Boreal	41	0	38
Alpha-Cypermethrin	Fastac SC Super Contact	0	1	1
Chlorpyrifos	Clorpirifos 48, Clorpirifos 48 DA, Chas 25, Chas 48, Closar 48, Inaclor 48 EC, Panda 48 LE, Aurus 48, Dursban 48, Nufos 48 EC, Pirifos 48	24	0	24
Cipermetrin	Poly 10	2	0	2
Deltamethrin	Decis Protech, Decis Expert, Audace EC	8	0	8
Imidacloprid	Confidor 20 LS, DACOPRID 20 SL	2	0	2
Lambda-cyhalothrin	Atrapa, Karate+, Karate Zeon, Karate King, Judo	6	14	17
	Total	83	15	**98**
Granulated				
Chlorpyrifos	Cloripirifos 5 GR, Pison, Closar 5 GR, Piritec 5 GR, Chas 5 G, Clorifos 5 G	49	0	49
Lambda-cyhalothrin	Pointer Geo, TRIKA Lambda 1	16	0	16
Teflutrin	Force 1.5 G	1	0	1
	Total	66	0	**66**
Total		**285**	**105**	**390**

Table A 5: Explanations for *changed* insect and corn borer control practice in MON 810 (Section 3.4.1.4)

Country	Quest. Nr.	Insecticides in conv. maize	Insect control practice in MON 810	Explanation of differences in insect control practice
Spain	4720	yes	changed	I do not treat YieldGard against ECB and I do treat Conventional maize.
Spain	4763			I do not need to treat YieldGard against ECB, but I do need to do it with Conventional maize.
Spain	4776			I treat the Conventional maize against ECB, in the YieldGard is not necessary.
Spain	4782			I do treat Conventional maize against ECB and the YieldGard I do not.
Spain	4787			I do not need to treat YieldGard against ECB, I treat the Conventional maize.
Spain	4795			I do not have to treat YieldGard against ECB but the Conventional maize I do.
Spain	4815			I do treat the Conventional maize against ECB, the YieldGard I do not.
Spain	4830			I treat the Conventional maize against ECB, in the YieldGard is not necessary.
Portugal	4628			The regular seed treatment was similar in YG and conventional ones. The farmer made 2 less insecticide treatments in YG.
Portugal	4629			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4630			The farmer made 1 less insecticide treatments in YG. The regular seed treatment was similar in YG and conventional ones.
Portugal	4631			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4632			The farmer made 1 less insecticide treatments in YG. The regular seed treatment was similar in YG and conventional ones.
Portugal	4633			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4634			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4635			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4636			The farmer made 1 less insecticide treatments in YG. The regular seed treatment was similar in YG and conventional ones.
Portugal	4637			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.
Portugal	4639			The regular seed treatment was similar in YG and conventional ones. The farmer made 1 less insecticide treatments in YG.

Country	Quest. Nr.	Insecticides against corn borers in conv. maize	Corn borer control in MON 810	Explanation of differences in corn borer control practice
Portugal	4630	Yes	similar	The farmer didn´t make any treatments for the control of maize borer in the Yieldgard fields.
Spain	4720	Yes	changed	I do not need to treat YieldGard against ECB but I do need to treat the Conventional maize.
Spain	4763			I do not treat YieldGard against ECB, but I do it with Conventional maize.
Spain	4776			YieldGard is resistant to ECB and I do not need to treat, Conventional maize has to be treated against ECB.
Spain	4782			Conventional maize has ECB attack and I do have to treat it, the YieldGard I do not.
Spain	4787			I treat Conventional maize against ECB, in the YieldGard is not necessary.
Spain	4795			I treat Conventional maize against ECB, in the YieldGard is not necessary.
Spain	4815			I do not need to treat YieldGard against ECB, in Conventional maize I apply two insecticide treatments against ECB.
Spain	4830			I do not need to treat YieldGard against ECB but I do need to do it in Conventional maize.
Portugal	4628			The farmer had no need to make any treatments for the control of maize borer in the Yieldgard maize fields.
Portugal	4629			The farmer didn´t make any treatments for the control of maize borer in the Yieldgard maize fields because it wasn´t necessary.
Portugal	4631			The farmer had no need to make any treatments for the control of maize borer in the Yieldgard maize fields.
Portugal	4632			The farmer didn´t make any treatments for the control of maize borer in the Yieldgard fields.
Portugal	4633			The farmer didn´t make any treatments for the control of maize borer in the Yieldgard maize fields because it wasn´t necessary.
Portugal	4634			The farmer had no need to make any treatments for the control of maize borer in the Yieldgard maize fields.
Portugal	4635			The farmer had no need to control the maize borer. Without any treatments for the control of maize borer.
Portugal	4636			The farmer didn´t make any treatments for the control of maize borer in the Yieldgard fields.
Portugal	4637			The farmer didn´t make any treatments for the control of maize borer in the Yieldgard maize fields because it wasn´t necessary.
Portugal	4639			The farmer had no need to make any treatments for the control of maize borer in the Yieldgard maize fields.

Table A 6: Herbicides applied in MON 810 (Section 3.4.1.5)

Active Ingredient	Herbicides as stated by the farmers	Spain	Portugal	Total
(S)-Metolachlor, Terbuthylazine	Primextra Líquido Gold	104	0	104
Mesotrione, (S)-Metolachlor	Camix	80	0	80
Nicosulfuron	Elite Plus 6 OD	51	7	58
Isoxaflutole	Spade Flexx	33	0	33
Dicamba 48%	Banvel D	25	0	25
Fluroxypyr	Starane 20	19	0	19
Foramsulfuron, Thiencarbazone-methyl, Cyprosulfamide	MONSOON ACTIVE	17	0	17
Mesotrione	Callisto	16	6	22
Aclonifen, Isoxaflutole	Memphis	10	0	10
Aclonifen, Isoxaflutole	Lagon	8	0	8
Tembotriona 4,4%	Laudis OD	7	0	7
(S)-Metolachlor, Terbuthylazine	Cuña Plus	6	0	6
Bromoxynil	Buctril	6	0	6
Dimethenamid-P	Spectrum	6	0	6
Nicosulfuron	Chaman	6	0	6
Pethoxamid	Successor 600	6	0	6
(S)-Metolachlor, Terbuthylazine	Tyllanex Magnum	4	0	4
Fluroxypyr	Hurler	4	0	4
Glyphosate	Roundup	4	0	4
Nicosulfuron	Elite M	4	0	4
Nicosulfuron	Nicosulfuron 4%	4	0	4
Nicosulfuron 4%	Nic-Sar	4	0	4
2,4-D, Florasulam	Mustang	3	1	4
Dimetenamida-p 21,25%, Pendimetalina 25%	Wing P	3	0	3
Glyphosate	Roundup	3	0	3
Isoxadifen-ethyl, Tembotrione	Laudis	3	0	3
Nicosulfuron 4%	Nico	3	0	3
Sulcotriona 30%	Sulcogan 300	3	0	3
Dicamba 50%, Prosulfuron 5%	Casper	2	0	2
Fluroxipir 20%	Hudson 20 EC	2	0	2
Mesotriona 7,5%, Nicosulfuron 3%	Elumis 105 OD	2	0	2
Nicosulfuron	Elite Plus 6 OD	2	0	2
Sulcotrione	Pentagon	2	0	2
Bromoxynil	Bromotril 24 EC	1	0	1
Fluroxipir 20%	Praxis	1	0	1
Fluroxypyr	Tomahawk	1	0	1
Foramsulfuron, Isoxadifen-ethyl	Cubix	1	0	1
Glyphosate 36%	GLIMUR	1	0	1
Nicosulfuron	Bandera 4 SC	1	0	1
Nicosulfuron	Nicogan	1	0	1
Nicosulfuron	Nicozea	1	0	1
Nicosulfuron	Sajon	1	0	1
Nicosulfuron	Samson	1	0	1
Nicosulfuron 4%	Nicosulfuron 4 SC	1	0	1
Nicosulfuron 4%	Nisshin	1	0	1
Oxyfluorfen	GOAL	1	0	1
Pendimetalina 33%	Stomp LE	1	0	1
Pendimetalina 36,5%	Most Micro HL	1	0	1
Pendimethalin	Stomp Aqua	1	0	1

Pethoxamid	Koban 600	1	0	1
Rimsulfuron	Principal	1	0	1
Sulcotrione	Sulcotrina	1	0	1
Mesotrione, (S)-Metolachlor, Terbuthylazine	Lumax	0	12	12
Foramsulfuron, Isoxadifen-ethyl	Option	0	11	11
Nicosulfuron	Samson	0	6	6
Bentazon, Dicamba	Laddok Plus	0	1	1
Isoxaflutole	Adengo	0	1	1
Total		**471**	**45**	**516**

Table A 7: Explanations for different harvest time of MON 810 (Section 3.4.1.9)

Country	Quest. Nr.	Harvest	Comments aggregate	Comments
Spain	4776	later	Sown later, harvested later	I plant YieldGard later and I also harvest it later.
Spain	4682		YieldGard maturates later	YieldGard has more humidity than Conventional maize and maturates a few days later.
Spain	4720			YieldGard has a longer-cycle than Conventional maize and I harvest it later.
Spain	4782			YieldGard has more humidity and maturates later than Conventional maize, I also harvest it later.
Spain	4822			I plant YieldGard of short-cycle later than Conventional maize and I also harvest it later.

Table A 8: Explanations for characteristics of MON 810 different from $as\ usual$ (Section 3.4.2)
Grey-colored fields mark answers that are not “as usual”.

Country	Quest . Nr.	Germi-nation	Emergence	Male flow-ering	Plant growth	Stalk/-root lodging	Maturity	Yield	Volun-teers	Comments
Spain	4643	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard greener, healthier, does not fall and there are no volunteers, without ECB damages, it maturates a few days later and
Spain	4646	more vigourous	accelerated	as usual	accelerated	less often	delayed	higher yield	less often	YieldGard is more vigorous, emerges earlier, grows faster, without ECB damages, does not fall and there are no volunteers, it is
Spain	4652	as usual	as usual	as usual	as usual	as usual	as usual	lower yield	as usual	This year Conventional maize has been more productive because its grain has higher specific weight than the planted variety of
Spain	4653	more vigourous	accelerated	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard emerges earlier and with higher vigour, it falls down less because it has no ECB damages, maturates a bit later and
Spain	4655	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard healthier, with no ECB damages, gives more kilos than Conventional maize.
Spain	4657	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard with no ECB damages, it does not fall and produces more than Conventional maize.
Spain	4659	more vigourous	accelerated	as usual	accelerated	less often	delayed	higher yield	less often	YieldGard is more vigorous, emerges earlier, grows faster, does not fall and there are less volunteers the next year, maturates
Spain	4660	more vigourous	accelerated	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard germinates with more vigour and emerges earlier, has no ECB damage, maturates a bit later and gives more kilos than
Spain	4662	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard has no ECB damages, is healthier and more productive than Conventional maize.
Spain	4663	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is healthier, has no ECB damages and gives more kilos than Conventional maize.
Spain	4664	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard healthier, with no ECB damages, produces more than Conventional maize.
Spain	4666	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and produces more than Conventional maize because it has no ECB damages.
Spain	4670	as usual	as usual	as usual	delayed	less often	delayed	as usual	as usual	YieldGard grows slower, does not fall and maturates a bit later than Conventional maize.
Spain	4671	more vigourous	accelerated	as usual	accelerated	less often	as usual	higher yield	as usual	YieldGard grows with more vigour and acelerates the nascence, gows faster, does not fall and produces more than Conventional
Spain	4673	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives more kilos than Conventional maize because it has no ECB damages.
Spain	4675	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard healthier, with no ECB damages, does not fall, there are no volunteers and produces more than Conventional maize.
Spain	4676	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard does not fall because it has no ECB damages, there are no volunteers, is healthier and it gives more kilos
Spain	4677	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard healthier, with no ECB damages, does not fall, is greener and matures a week later and gives more kilos than
Spain	4678	less	delayed	as usual	as usual	less often	delayed	higher	less	YieldGard grows a bit worst, does not fall, there are no volunteers, is healthier,

		vigourous						yield	often	greener and maturates a week later, with no
Spain	4679	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard healthier, does not fall and produces more than Conventional maize because it has no ECB damages.
Spain	4680	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard produces more kilos than Conventional maize because it has no ECB damages, does not fall, there are no volunteers and
Spain	4681	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because it has no ECB damages, is healthier and produces more than Conventional maize.
Spain	4682	as usual	delayed	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard emerges later, does not fall because it has no ECB damages, matures a few days later than Conventional maize and is
Spain	4684	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and is more productive than Conventional maize because it has no ECB damages.
Spain	4685	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard is healthier, with no ECD damages, does not fall and delays ripening because is greener and gives more kilos
Spain	4686	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard does not fall and there are less volunteers because it has no ECB damages and is more productive than Conventional
Spain	4687	as usual	accelerated	accelerate d	accelerate d	less often	as usual	higher yield	as usual	YieldGard emerges earlier, flowers earlier and grows faster, does not fall and gives more kilos than Conventional maize
Spain	4689	more vigourous	accelerated	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard emerges with more vigour and earlier, does not fall because it has no ECB damages, is greener and maturates later and
Spain	4690	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because it has no ECB damages, is all harvested and gives more kilos than Conventional maize.
Spain	4692	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has no ECB damages, is healthier, does not fall and produces more than Conventional maize.
Spain	4693	more vigourous	accelerated	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard emerges faster and more vigorous, does not fall because it has no ECB damages, is greener and maturates a few days
Spain	4694	more vigourous	accelerated	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is more vigorous and emerges earlier, is greener because it has no ECB damages, does not fall and produces rather more
Spain	4695	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is healthier, with no ECB damages, does not fall and there are no vounteers, it has more humidity and maturates a
Spain	4696	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB, does not fall, is all harvested and produces more than Conventional maize.
Spain	4698	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB, does not fall and is more productive than Conventional maize.
Spain	4699	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because it has no ECB damages and gives more yield than Conventional maize.
Spain	4700	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard greener, healthier, does not fall as it is resistant to ECB, there are less volunteers, maturates a bit later and
Spain	4701	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard is resistant to ECB, is healthier and does not fall, is greener and maturates later giving more kilos than
Spain	4702	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more kilos than Conventional maize because is resistant to ECB.
Spain	4703	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, does not fall because it has no ECB damages and gives more kilos than Conventional maize.
Spain	4704	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard with no ECB damages, does not fall and there are no volunteers in the field, greener, healthier and more productive
Spain	4705	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard does not fall as it has no ECB damages, there are less volunteers in the field, maturates a bit later because is

Spain	4708	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and gives more yield as is healthier than Conventional, with no ECB damages.
Spain	4709	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard with no ECB damages, does not fall and there are no volunteers. The plant and ear are healthier and produces more than
Spain	4710	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because it has no ECB damages and gives more kilos than Conventional maize.
Spain	4712	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard has no ECB damages, does not fall, is greener and delays ripening and produces more than Conventional maize.
Spain	4713	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more kilos than Conventional maize because is healthier, with no ECB damages.
Spain	4717	more vigourous	accelerated	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is more vigorous and emerges earlier, has no ECB damages and does not fall, is healthier and gives more kilos than
Spain	4718	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB, does not fall, is all harvested and produces more than Conventional maize.
Spain	4719	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more than Conventional maize because it has no ECB damages.
Spain	4720	as usual	as usual	as usual	as usual	as usual	delayed	higher yield	as usual	YieldGard is healthier because it is resistant to ECB, is greener and maturates later giving more kilos than Conventional maize.
Spain	4721	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, with no ECB damages, plants and ears do not fall down and is more productive than Conventional maize.
Spain	4726	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because is healthier, with no ECB damages, is all harvested and produces more than Conventional maize.
Spain	4727	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has no ECB damages, does not fall and gives more kilos than Conventional maize.
Spain	4731	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is resistant to ECB and produces more than Conventional maize.
Spain	4732	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more than Conventional maize because is healthier, with no ECB damages.
Spain	4734	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because is resistant to ECB, is halthier and gives more kilos than Convetional maize.
Spain	4737	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, does not fall and is more productive than Conventional maize because it has no ECB damages.
Spain	4742	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is resistant to ECB, does not fall and there are less volunteers and is more productive than Conventional maize.
Spain	4743	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard has no ECB damages, does not fall and there are no volunteers, is all harvested and produces 1.500 kg/ha more than
Spain	4751	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is resistant to ECB and does not fall, there are no volunteers, is healthier and gives more kilos than Conventional
Spain	4752	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	Yieldgard does not fall because it has no ECB damages, is all harvested and gives more kilos than Conventional maize.
Spain	4753	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces at least 500 kg/ha more than Conventional maize as it has no ECB damages.
Spain	4757	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard has no ECB damages and produces more than Conventional maize.
Spain	4758	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard gives more kilos than Conventional maize because it does not fall and is healthier, with no ECB damages.
Spain	4760	as usual	as usual	as usual	as usual	less often	delayed	higher	as	YieldGard is healthier, greener, maturates a bit later, does not fall as it has no

								yield	usual	ECB damages and gives more kilos than
Spain	4762	as usual	as usual	accelerated	accelerated	less often	as usual	higher yield	less often	YieldGard flowers earlier and develops faster, does not fall and there are no volunteers, has no ECB damages and produces 1.500
Spain	4763	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard has more humidity, is greener and maturates a bit later than Conventional maize.
Spain	4765	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is more productive than Conventional maize because it has no ECB.
Spain	4766	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is resistant to ECB, gives more kilos than Conventional maize, does not fall and there are less volunteers.
Spain	4767	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and gives more kilos than Conventional maize because it has no ECB damages.
Spain	4768	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, with no ECB damages, does not fall and produces more than Conventional maize.
Spain	4770	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and produces more than Conventional maize because is resistant to ECB.
Spain	4773	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more than Conventional maize because it has no ECB damages.
Spain	4774	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is healthier, with no ECB damages and produces 500 kg/ha more than Conventional maize.
Spain	4775	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and gives more kilos than Conventional maize because it has no ECB damages.
Spain	4776	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and produces more than Conventional maize because it has no ECB damages.
Spain	4782	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard has no ECB damages, maturates later because is greener and it gives more kilos than Conventional maize.
Spain	4783	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is healthier because is resistant to ECB, does not fall, there are less volunteers and is more productive than
Spain	4787	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard does not fall because it has no ECB damages, is greener and maturates a bit later and produces more than Conventional
Spain	4788	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard has no ECB damages, does not fall and there are no volunteers, is greener and delays a bit the ripening and produces
Spain	4790	as usual	as usual	as usual	as usual	less often	delayed	as usual	as usual	YieldGard has no ECB damages, does not fall, is greener, healthier and maturates a few days later than Conventional maize.
Spain	4791	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives more kilos than Conventional maize because it has no ECB damages.
Spain	4792	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and produces more than Conventional maize because is healthier, with no ECB damages.
Spain	4794	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and gives more kilos than Conventional maize because it has no ECB damages.
Spain	4795	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard is healthier, greener and maturates a week later than Conventional maize.
Spain	4800	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and gives more kilos than Conventional maize bcause it has no ECB damages.
Spain	4802	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is greener and delays the ripening, has no ECB damages, does not fall and there are less volunteers and is more
Spain	4804	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall and produces more than Conventional maize because is healthier, with no ECB damages.

Spain	4807	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard does not fall, there are less volunteers, is healthier, greener and maturates a bit later, hsa no ECB damages and
Spain	4808	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard has no ECB damages, there are no volunteers, maturates a few days later and gives more kilos than Conventional maize.
Spain	4813	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard is greener, with more humidity and maturates a few days later than Conventional maize.
Spain	4815	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard has more humidity and maturates a week later than Conventional maize.
Spain	4818	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is resistant to ECB, does not fall and there are less volunteers, is greener and maturates a bit later and produces
Spain	4819	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard has no ECB damages, does not fall and there are no volunteers, maturates a few days later because it has more humidity
Spain	4820	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard does not fall because it has no ECB damages, is all harvested and produces more than Conventional maize.
Spain	4830	as usual	as usual	as usual	as usual	less often	delayed	higher yield	as usual	YieldGard does not fall because it has no ECB damages, is greener and maturates a few days later and is more productive than
Spain	4834	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is more productive than Conventional maize even in years with less ECB attack.
Spain	4842	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, with no ECB damages, does not fall, is all harvested and produces more than Conventional maize.
Spain	4844	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard does not fall and there are no volunteers, is greener and maturates a bit later and gives more kilos than Conventional
Spain	4846	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is resistant to ECB, does not fall and gives more kilos than Conventional maize.
Spain	4848	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard produces more than Conventional maize because it does not fall and has no ECB damages.
Spain	4849	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard is healthier, with no ECB damages, does not fall and produces 15% more than Conventional maize.
Spain	4851	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard is resistant to ECB, does not fall and there are no volunteers, is all harvested and produces more than Conventional
Spain	4857	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard produces more than Conventional maize because it has no ECB damages.
Spain	4862	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives more kilos than Conventional maize because it is resistant to ECB.
Spain	4866	as usual	as usual	as usual	as usual	less often	as usual	higher yield	less often	YieldGard has no ECB damages, does not fall, there are no volunteers and produces more than Conventional maize.
Spain	4867	as usual	as usual	as usual	as usual	less often	delayed	higher yield	less often	YieldGard is healthier, greener, maturates a bit later, there are less volunteers because it does not fall, has no ECB damages
Spain	4868	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard is more productive than Conventional maize because is resistant to ECB, it is healthier.
Spain	4874	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	YieldGard gives more kilos than Conventional maize because is resistant to ECB.
Spain	4876	as usual	as usual	as usual	as usual	less often	as usual	higher yield	as usual	YieldGard has no ECB damages, does not fall, is healthier and more productive than Conventional maize.
Spain	4877	as usual	as usual	as usual	as usual	as usual	delayed	as usual	as usual	YieldGard has more humidity, is greener and maturates a few days later than Conventional maize.
Portugal	4628	more	as usual	as usual	as usual	as usual	as usual	higher	as	The most important agronomical characteristics mentioned by the farmer were

		vigourous						yield	usual	the high germination vigour and sanity which caused
Portugal	4629	as usual	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The huge sanity of the Yieldgard maize, the high germination vigour and the higher safety production were the most important
Portugal	4630	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	High sanity of Yieldgard maize caused an huge safety production of the Yieldgard maize and high (average) productivities in the
Portugal	4631	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	Excellent and high sanity and huge vigour of Yieldgard plants which caused an huge safety production of the Yieldgard maize. In
Portugal	4632	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The most important agronomical characteristics mentioned by the farmer were the high sanity and germination vigour which caused
Portugal	4633	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The most important agronomical characteristics mentioned by the farmer were the huge production safety, sanity and greater
Portugal	4634	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The quality, huge vigour and force, high sanity and safety production in the Yieldgard maize fields were the most important
Portugal	4635	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The yieldgard plants distinguishes itself for the quality, vigour and enormous sanity. In that last campaign the farmer registed
Portugal	4636	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The most important agronomical characteristics mentioned by the farmer were the huge sanity, highr vigour and great quality of
Portugal	4637	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The most important agronomical characteristics mentioned by the farmer were the high quality, vigour and force which provides
Portugal	4638	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	High vigour and force of Yieldgard maize stand out clearly and caused an huge safety production of the Yieldgard maize and good
Portugal	4639	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The Sanity of Yieldgard maize plants was responsable for the higher vigour and force and high productivities in the Yielsdgard
Portugal	4640	more vigourous	as usual	as usual	as usual	as usual	as usual	higher yield	as usual	The most important agronomical characteristics mentioned by the farmer were the high vigour, force and quality of Yieldagard

Table A 9: Additional observation during plant growth of MON 810 (Section 3.4.2)

Country	Quest. Nr.	Comments aggregate	Comments
Spain	4642	No corn borer in 2016	When there is no ECB there are no differences between YieldGard and Conventional maize.
Spain	4645		There was no attack of ECB and there are no differences between YieldGard and Conventional maize.
Spain	4649		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4658		There has been no ECB and there are no differences between YieldGard and Conventional maize.
Spain	4668		When there is no ECB there are no differences between YieldGard and Conventional maize.
Spain	4670		There has been no ECB this year and there are no differences in production between YieldGard and Conventional maize.
Spain	4674		There has been no ECB attack this season and there are no differences between YieldGard and Conventional maize.
Spain	4697		There was no ECB attack and there were no differences between YieldGard and Conventional.
Spain	4704		The ear is very well developed as it has no ECB.
Spain	4711		When there is no ECB attack there are no differences between YieldGard and Conventional maize.
Spain	4714		There was no ECB attack and there are no differences between and Conventional maize.
Spain	4716		There was no ECB attack and there are no differences between and Conventional maize.
Spain	4724		When there is no ECB attack, there are no differences between YieldGard and Conventional maize.
Spain	4725		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4730		There was no ECB attack and there are no differences between and Conventional maize.
Spain	4735		There are no differences between YieldGard and Conventional maize as there was no ECB attack.
Spain	4738		When there is no ECB attack, there are no differences between YieldGard and Conventional maize.
Spain	4741		There are no differences between YieldGard and Conventional when there is no ECB attack.
Spain	4746		There was no ECB attack and there were no differences between YieldGard and Conventional maize.
Spain	4749		There was no ECB attack and there are no differences between YieldGard and Conventional maize.
Spain	4750		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4755		There was no ECB attack and there are no differences between YieldGard and Conventional maize.
Spain	4761		When there is small attack of ECB there are no differences between YieldGard and Conventional maize.
Spain	4772		When there is no ECB, there are no differences between YieldGard and Conventional maize.
Spain	4779		There are no differences between YieldGard and Conventional maize because the attack od ECB was very small.
Spain	4785		There was no ECB attack nor were there differences between YieldGard and Conventional maize.
Spain	4786		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4799		When there is no ECB there are no differences between YieldGard and Conventional maize.
Spain	4805		There was no ECB attack nor differences between YieldGard and Conventional maize.
Spain	4806		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4809		There was no ECB attack and there were no differences between YieldGard and Conventional maize.
Spain	4813		This year ECB attack was very small.
Spain	4816		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4817		There was no ECB attack nor differences between YieldGard and Conventional maize.
Spain	4822		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4825		There was no ECB attack and there are no differences between YieldGard and Conventional maize.
Spain	4826		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4829		There was no ECB attack and there were not differences between YieldGard and Conventional maize.

Spain	4832		There was no ECB attack nor differences between YieldGard and Conventional maize.
Spain	4833		If there is no ECB, there are no differences between YieldGard and Conventional maize.
Spain	4837		There was no ECB attack, nor differences between YieldGard and Conventional maize.
Spain	4839		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4845		There are no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4854		There was no ECB attack and there are no differences between YieldGard and Conventional maize.
Spain	4859		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4860		There was no ECB attack and there were not differences between YieldGard and Conventional maize.
Spain	4864		There was no ECB attack nor differences between YieldGard and Conventional maize.
Spain	4865		There were no differences between YieldGard and Conventional maize because there was no ECB attack.
Spain	4871		If there is no ECB attack, there are no differences between YieldGard and Conventional maize.
Spain	4873		There was no ECB attack and there were not differences between YieldGard and Conventional maize.
Spain	4660		YieldGard always produces a bit more than Conventional maize, even in years with not a lot of ECB.
Spain	4695		YieldGard has 0,5 - 1 degrees more of humidity than Conventional maize.
Spain	4705		The grain of YieldGard has more humidity than the Conventional one.
Spain	4720		YieldGard has one more degree of humidity than the Conventional maize.
Spain	4775	YieldGard has higher humidity	YieldGard produces 1.500 kg/ha more than Conventional maize.
Spain	4787		YieldGard takes a week longer to get dry than Conventional maize because is healthier and greener.
Spain	4808		YieldGard is greener and with a higher degree of humidity than Conventional maize.
Spain	4818		YieldGard is healthier and with more humidity than the Conventional maize.
Spain	4844		YieldGard has one or two more humidity degrees than Conventional maize.

Table A 10: Additional comments on disease susceptibility (Section 3.4.3)

Country	Quest. Nr.	Disease susceptibility	Comments aggregate	Comments
Portugal	4629	as usual	No differences	High presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4630	as usual		High presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4631	as usual		High presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4633	as usual		Notorious an high presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4635	as usual		High presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4636	as usual		High presence in the local / region of production of the disease "Erwinia Zea" but without any difference in susceptibility between conventional maize and yieldgard maize
Portugal	4638	as usual		Practically nonexistent (diseases) in the production region.
Portugal	4640	as usual		Nothing to mention for diseases susceptibility, without any difference.
Spain	4659	less susceptible	YieldGard less susceptible to Ustilago.	YieldGard does not have Ustilago attack and the Conventional does. YieldGard is healthier, with no ECB damages and does not suffer of Ustilago attack. Conventional maize does have Ustilago attack
Spain	4680	less susceptible		YieldGard has less Ustilago attack than Conventional maize. YieldGard is healthier, with no ECB damages and suffers less Ustilago attack than Conventional maize.
Spain	4664	less susceptible	YieldGard less susceptible to Cephalosporium.	YieldGard has less Cephalosporium attack than Conventional maize. YieldGard has no ECB damages and it has less problems of Cephalosporium than Conventional maize.
Spain	4701	less susceptible	YieldGard less susceptible to Fusarium.	YieldGard has less attack of Fusarium than Conventional maize. YieldGard has no ECB injuries and it suffers less attack of Fusarium than Conventional maize.
Spain	4705	less susceptible		YieldGard has less attack of Fusarium than Conventional maize. YieldGard is resistant to ECB, has no injuries and is attacked less by Fusarium than Conventional maize.
Spain	4790	less susceptible		YieldGard has less attack of Fusarium than Conventional maize. YieldGard does not have have ECB injuries and it has less attack of Fusarium than Conventional maize.
Spain	4844	less susceptible		YieldGard does not have Fusarium attack and the Conventional maize does. YieldGard has no ECB injuries and does not suffer Fusarium attack.
Spain	4849	less susceptible		YieldGard has less Fusarium attack than Conventional maize. YieldGard is healthier than Conventional maize and has less attack of Fusarium.
Spain	4762	less susceptible	YieldGard less susceptible to Sphacelotheca.	YieldGard has no ECB damages and does not suffer the attack of Sphacelotheca and the Conventional maize does. YieldGard has no ECB injuries and the fungi can not penetrate.

Spain	4851	less susceptible	YieldGard less susceptible to fungi.	YieldGard has less attack of Sphacelotheca than Conventional maize. YieldGard is healthier and has less attack of Sphacelotheca than Conventional maize.
Spain	4868	less susceptible		YieldGard has less attack of Sphacelotheca than Conventional maize. YieldGard is healthier, with no ECB damages and has less Sphacelotheca attack than Conventional maize.
Spain	4783	less susceptible		YieldGard has no ECB injuries and has less attack of fungi than Conventional maize. ECB injuries are the route of entry of fungi, for this reason YieldGard has less problems of fungi than Conventional maize.
Spain	4819	less susceptible		YieldGard is healthier and has less attack of fungi than Conventional maize. YieldGard does not have route of entry for fungi because it does not have injuries of ECB and the Conventional maize does.
Spain	4842	less susceptible		YieldGard has less attack of Fungi than Conventional maize because it has no ECB injuries. YieldGard does not have Fusarium attack nor Sphacelotheca and the Conventional maize does.
Spain	4857	less susceptible	YieldGard less susceptible to Virus.	YieldGard has less attack of Virus than Conventional maize. YieldGard has less attack of MDMV and MRDV than Conventional maize.
Spain	4671	less susceptible	YieldGard less susceptible to several diseases.	YieldGard has no ECB damages and has less Fusarium and Cephalosporium attack than Conventional maize. YieldGard is healthier and resists better Fusarium and Cephalosporium attacks than Conventional maize.
Spain	4700	less susceptible		YieldGard has less attack of Ustilago, Fusarium and Sphacelotheca than Conventional maize. YieldGard is healthier, without injuries and ECB damages and it has less problems of fungi than Conventional maize.

Table A 11: Additional comments on insect pest control (Section 3.4.4)

Country	Quest. Nr.	Ostrinia nubilalis	Sesamia spp.	Comments
Portugal	4628	very good	very good	Control of maize borers almost perfect in the Yieldgard maize.
Portugal	4629			Almost perfect answer of the Yieldgard maize for the control of maize borers.
Portugal	4630			The most amazing (almost total) answer of the Yieldgard maize for the control of maize borers.
Portugal	4631			Effective control of maize borers in the Yieldgard maize.
Portugal	4632			Excellent and effective answer of the Yieldgard maize for the control of maize borers.
Portugal	4633			Really awesome control of maize borers in the Yieldgard maize.
Portugal	4634			Total control of maize borers in the Yieldgard maize.
Portugal	4635			Total control of maize borers in the Yieldgard maize.
Portugal	4636			Excellent responsiveness on the control of maize borers in the Yieldgard maize
Portugal	4637			Fantastic an safety control of maize borers in the Yieldgard maize.
Portugal	4638			Safety and security for the producer to control of maize borers in the yieldgard maize.
Portugal	4639			Enormous security for the producer.
Portugal	4640			The control of maize borers in the Yieldgard maize was really good.

Table A 12: Additional comments on pest susceptibility (Section 3.4.5)

Country	Quest. Nr.	Pest susceptibility	Order of insect pest	Comments aggregate	Comments
Portugal	4611	as usual		Nothing to report.	The region of production had a quite lower incidence of pests attacks. Nothing to report.
Portugal	4613	as usual			Despite the region of production had an higher incidence of pests attacks in this last campaign the farmer had nothing to report about differences in pests susceptibility.
Portugal	4598	as usual	Agrotis Ipsilon Spodoptera Frugiperda	YieldGard more resistant in general	The sanity of the Yieldgard is remarkable and evident and so provided more resistant from the attack of the different other pests like Agrotis Ipsilon.
Portugal	4579	less susceptible	Agrotis Ipsilon Tetranychus spp.		Despite the Yieldgard event was specific for the control of maize borer the Yieldgard plants were less susceptible (more resistant) from the attacks of other pests because the high sanity of Yieldgard plants.
Portugal	4580	less susceptible	Agrotis Ipsilon		Yieldgard maize plants were more resistant to the others pests (less susceptible to diseases), justified based in the Large Sanity of the Yieldgard Maize.
Portugal	4581	less susceptible	Agrotis Ipsilon		Provided by the large quality and sanity of Yieldgard plants the Yieldgard maize plants were more resistant to the others pests (less susceptible to diseases)
Portugal	4582	less susceptible	Agrotis Ipsilon Tetranychus spp.		Yieldgard maize plants were more resistant to the others pests, justified based in the Large Sanity and Safety Production of the Yieldgard Maize.
Portugal	4583	less susceptible	Agrotis Ipsilon		Yieldgard maize plants were indirectly more resistant to the others pests (less susceptible to other pests) justified by the greater vigour and sanity of the Yieldgard maize.
Portugal	4584	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.		Yieldgard maize was mostly more resistant to the attack of the different other pests. The reason for that was the high sanity of the Yieldgard maize.
Portugal	4586	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.		The sanity of Yieldgard maize and the safety production were the reasons why the Yieldgard plants were less susceptible (more resistant) from the attacks of other pests.
Portugal	4587	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.		The fact that the Yieldgard maize was resistant to the attack of the maize borer pest made the Yieldgard plants less susceptible (more resistant) from the attacks of other pests.
Portugal	4588	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		Yieldgard maize high sanity and huge production safety provides to the Yieldgard maize fields more resistant and better protection to the attack of others pests.
Portugal	4589	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.		The high sanity of the Yieldgard plants and the fact of the Yieldgard maize was resistant to the attack of the maize borer pest made the Yieldgard plants less susceptible (more resistant) from the attacks of other pests.
Portugal	4590	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.		The amazing sanity of the Yieldgard maize provided more resistant from the attack of the diferent other pests. It was a great advantage of the Yieldgard maize fields.
Portugal	4591	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The fantastic sanity of the Yieldgard maize provided a little more resistant from the attack of the diferent other pests.
Portugal	4592	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		Yieldgard maize huge production safety was remarkable and provides to the Yieldgard maize fields more resistant and better protection to the attack of others pests.
Portugal	4593	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The sanity and the safety production of Yieldgard maize were the reasons why the Yieldgard plants were less susceptible (more resistant) from the attacks of other pests.
Portugal	4594	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The better sanity of the Yieldgard maize provided a better resistant from the attack of the diferent other pests.

Portugal	4595	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.	The excellent sanity of the Yieldgard maize provided a little more resistant from the attack of the diferent other pests.
Portugal	4596	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The fact that the Yieldgard maize was resistant to the attack of the maize borer pest provides to the Yieldgard plants less susceptible (more resistant) from the attacks of other pests.
Portugal	4597	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The high and amazing sanity of the Yieldgard maize provided more resistant from the attack of the diferent other pests.
Portugal	4599	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The sanity and the quality of the Yieldgard maize are the main reasons of the better resistant from the attack of the different other pest.
Portugal	4601	less susceptible	Agrotis Ipsilon	The sanity of Yieldgard maize and the high level of safety production were the reasons why the Yieldgard plants were a little less susceptible from the attacks of other pests.
Portugal	4602	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda Tetranychus spp.	The Yieldgard maize provides a high level of production safety, was a big added value and a high sanity of the Yieldgard plants
Portugal	4603	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The sanity of the Yieldgard maize was the reason and an added value which provided more resistant from the attack of the different other pests.
Portugal	4605	less susceptible	Agrotis Ipsilon	The fact that the Yieldgard maize was resistant to the attack of the maize borer pest made indirectly the Yieldgard plants less susceptible (more resistant) from the attacks of other pests like Agrotis Ipsilon. In this campaign the attack of pests in region was a little more higher.
Portugal	4606	less susceptible	Agrotis Ipsilon	The excellent and high sanity of the Yieldgard maize provided a little more resistant from the attack of the diferent other pests.
Portugal	4607	less susceptible	Agrotis Ipsilon	The sanity of the Yieldgard maize provided more resistant from the attack of the diferent other pests.
Portugal	4608	less susceptible	Agrotis Ipsilon	Despite the region of production had a lower incidence of pests, the plots of Yieldgard maize were a little more resistant to the attack of different other pests like Agrotis Ipsilon.
Portugal	4610	less susceptible	Agrotis Ipsilon	The sanity and the safety production of Yieldgard maize were the main reasons for the Yieldgard plants were less susceptible from the attacks of other pests.
Portugal	4612	less susceptible	Agrotis Ipsilon 1Red Spider	In this last campaign the region of production had an higher incidence level of pests like Agrotis and Agriotes. So the farmer noted that the Yieldgard maize fields were more protected against the attack of those other pests.
Portugal	4615	less susceptible	Agrotis Ipsilon	The sanity, quality and the safety production of Yieldgard maize were the great advantages and the main reasons for the Yieldgard plants were less susceptible from the attacks of other pests.
Portugal	4616	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The sanity of the Yieldgard maize provided more resistant from the attack of the different other pests.
Portugal	4617	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The sanity and quality of Yieldgard maize were the main reasons for the Yieldgard plants were less susceptible from the attacks of other pests.
Portugal	4618	less susceptible	Agrotis Ipsilon 1Red Spider	In this last campaign the region of production had a Higher incidence of pests. The Sanity of Yieldgard maize provides more resistant to the attack of different other pests.
Portugal	4619	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The region of production had a Higher incidence of pests in this last campaign. The huge sanity of Yieldgard maize were important for the less susceptible from the attacks of other pests.
Portugal	4620	less susceptible	Agrotis Ipsilon	The sanity of the Yieldgard maize provided more resistant from the attack of the diferent other pests like agrotis Ipsilon.
Portugal	4622	less susceptible	Agrotis Ipsilon	The farmer noted in this campaign that the Yieldgard maize provided a little resistant from the attack of other pests like Agrotis Ipsilon.
Portugal	4623	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda	The high sanity and safety production of Yieldgard maize were the great advantages and the main reasons for the Yieldgard plants were less susceptible from the attacks of other pests.

Portugal	4624	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The fact that the Yieldgard maize was resistant to the attack of the maize borer pest made indirectly the Yieldgard plants less susceptible (more resistant) from the attacks of other pests.
Portugal	4625	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The plots of Yieldgard maize were also attacked by other pests but in general the Yieldgard maize was less susceptible to the attack of those different other pests.
Portugal	4626	less susceptible	Agrotis Ipsilon Spodoptera Frugiperda		The great advantages of the Yieldgard maize like the huge sanity and production safety provided a little more resistant (less susceptibile) from the attack of the diferent other pests.
Portugal	4627	less susceptible	Agrotis Ipsilon		The plots of Yieldgard maize were also attacked by other pests but in general the Yieldgard maize was less susceptible to the attack of those different other pests like Agrotis Ipsilon.
Portugal	4585	less susceptible	Spodoptera Frugiperda Agrotis Ipsilon Tetranychus spp.		The sanity of Yieldgard, dry maize, and the safety production made all the difference and provides indirectly that the Yieldgard plants were less susceptible (more resistant) from the attacks of other pests.
Portugal	4604	less susceptible	Tetranychus spp. Agrotis Ipsilon		The amazing sanity of Yieldgard plants provided a little more resistant from the attack of the diferent other pests.
Portugal	4609	less susceptible	Tetranychus spp.		The sanity of the Yieldgard maize provided more resistant from the attack of the diferent other pests.
Spain	4487	less susceptible	Heliothis	YieldGard more resistant to Heliothis	YieldGard is healthier and has no Heliothis attack but the Conventional has it.
Spain	4540	less susceptible	Heliothis		There is no attack of Heliothis in YieldGard but there is attack in Conventional.
Spain	4433	as usual	Mythimna spp.	YieldGard more resistant to Mythimna	When there is plague of Mythimna only attacks Conventional, never the YieldGard.
Spain	4425	less susceptible	Mythimna spp.		Conventional has more attack of Mythimna than YieldGard.
Spain	4427	less susceptible	Mythimna spp.		YieldGard has no Mythimna attack and the Conventional has it.
Spain	4436	less susceptible	Mythimna spp.		YieldGard has no Mythimna attack and the Conventional has it.
Spain	4437	less susceptible	Mythimna spp.		When there is attack of Mythimna there is higher presence of the plague in Conventional than in YieldGard.
Spain	4556	less susceptible	Mythimna spp.		YieldGard has less Mythimna attack than Conventional.
Spain	4371	less susceptible	Red Spider	YieldGard more resistant to Red Spider	In YieldGard there are less attacks of Red spiders than in Conventional.
Spain	4377	less susceptible	Red Spider		YieldGard is healthier and has less attacks of Red spiders than the Conventional.
Spain	4531	less susceptible	Red Spider Heliothis		There is less attack of Red spider and Heliothis in YieldGard than in Conventional.
Spain	4534	as usual	Spodoptera exigua	YieldGard more resistant to Spodoptera	YieldGard has less attack of Spodoptera than Conventional.
Spain	4431	less susceptible	Spodoptera exigua		Spodoptera attacks much more to the Conventional maize than to the YieldGard.
Spain	4532	less susceptible	Spodoptera exigua		There is less attack of Spodoptera in YieldGard than in Conventional.
Spain	4533	less susceptible	Spodoptera exigua		Conventional has attack of Spodoptera and the YieldGard has not.
Spain	4528	less susceptible	Thysanoptera	YieldGard more resistant to Thrips	There is more attack of Thrips in Conventional than in YieldGard, Maize YieldGard is healthier.

Table A 13: Weeds that occurred in MON 810 (Section 3.4.6)

Name of weed	Frequency
Sorghum halepense	147
Abutilon theophrasti	124
Chenopodium album	82
Cyperus spp.	63
Amaranthus retroflexus	51
Datura stramonium	45
Echinochloa spp.	41
Xanthium strumarium	40
Setaria spp.	37
Digitaria sanguinalis	35
Solanum nigrum	30
Echinochloa crus-galli	12
Portulaca oleracea	8
Xanthium spinosum	8
Polygonum convolvulus	7
Phragmites australis	4
Cirsium arvense	2
Panicum spp.	2
Raphanus raphanistrum	2
Lolium spp.	2
Amaranthus blitoides	1
Cynodon dactylon	1
Alopecurus spp.	1
Malva spp.	1
Rumex spp.	1
Poa annua	1
Diplotaxis erucoides	1
Bromus spp.	1

Table A 14: Motivations for not complying with the label recommendations (section 3.5.2)

Country	Quest. Nr.	Compliance	Reasons
Spain	4657	no	I did not plant refuge because ECB causes me lots of yield losses.
Spain	4662		I have very strong ECB attacks and I cannot plant refuge with Conventional maize.
Spain	4668		Because I did not read the recommendations.
Spain	4694		Because I did not plant refuge.
Spain	4699		Because I did not plant refuge.
Spain	4727		Because I did not plant refuge.
Spain	4773		I did not plant Conventional maize as refuge.
Spain	4775		I did not plant refuge.
Spain	4798		I did not plant refuge.
Spain	4803		I did not plant refuge.
Spain	4808		I did not plant refuge.
Spain	4810		I did not plant refuge with Conventional maize.
Spain	4811		I did not plant refuge.
Spain	4812		I did not plant refuge.
Spain	4816		I did not plant the 20% for refuge, I planted less of Conventional maize.
Spain	4820		I planted less of 20% with Conventional maize for refuge.
Spain	4852		I did not plant refuge because I have small plots.
Spain	4872		I did not plant refuge.
Spain	4874		I did not plant refuge.

Table A 15: Motivations for not planting a refuge (section 3.5.3)

Country	Quest. Nr.	Plant refuge?	Reasons
Spain	4657	no	Because ECB causes me lots of yield losses.
Spain	4662		Because ECB causes me losses of harvest in the Conventional maize of the refuge.
Spain	4668		I am not informed, I do not know what a refuge plot is.
Spain	4694		Because ECB produces me lots of losses and the plots of Conventional maize of the neighbours are the refuge.
Spain	4699		Because I would lose production because of the ECB damages if I plant refuge with Conventional maize.
Spain	4727		Because ECB produces me lots of harvest losses.
Spain	4773		If I plant Conventional maize as refuge I would lose harvest because of the attack of ECB.
Spain	4775		Because ECB produces me lots of harvest losses.
Spain	4798		It complicates me the planting and I would lose harvest if there is ECB attack.
Spain	4803		I have small plots and it complicates me the planting.
Spain	4808		Because in the neighbour's plots other growers plant Conventional maize which are refuge to me.
Spain	4810		Because I would lose harvest if I plant Conventional maize in case there was ECB attack.
Spain	4811		Because ECB would produces me lots of harvest losses.
Spain	4812		I have small plots and it complicates me the planting.
Spain	4816		To plant the refuge I was given a few seed of Conventional maize and I planted less than 20%.
Spain	4820		I planted less than 20% with Conventional maize because I did not have more seed.
Spain	4852		Because I have very small plots.
Spain	4872		My neighbour plants Conventional maize and this is my refuge.
Spain	4874		In the neighbour's plots other growers plant Conventional maize which is my refuge.

7 Annex B Questionnaire

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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Code:

Year □□□□ Event □□ Partner □□□ Country □□ Interviewer □□

Farmer □□ Area □□

Coding explanations:

2	0	1	3	-	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[6]: MON Monsanto
MAR Markin
AGR Agro.Ges
... ...

Country: ES Spain
PT Portugal
RO Romania
…

Interviewer[7]: 01 A
02 B
03 …

Farmer: incremental counter within the interviewer

Area: incremental counter within the farmer

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[6] Partner is the organization that implements the survey

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

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2	0	1	5	-	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?[8]

O Yes O No

[8] Note: This question does not need to be asked in the 2013 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

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

O Herbicide(s)

8 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: _______________________________

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2	0	1	5	-	0	1	-	M	A	R	-	E	S	-	0	1	-	0	1	-	0	1

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

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 2013, 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 2013, did you change maize borer control practices in YieldGard® maize when compared to conventional maize?

O Similar O Changed, because:______________________

In 2013, how were the fertilizer application practices in YieldGard® maize when compared to conventional maize?

O Similar O Changed, because:______________________

In 2013, 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 vigourous	O Less vigourous
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[9] 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

---

[9] 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 ____
____
____
____