

Article

Expectations of the Participants of the Crop Insurance System and Their Implementation

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Abstract: The manufacture of agriculture production products is the most sensitive to meteorological conditions. The main risks caused by adverse climate factors that Lithuania's farmers confront are winterkill, hail, storms, and droughts. The aim of the study is to analyze the expectations of crop insurance system participants and to reveal the reasons for encouraging/discouraging farms in insuring their crops in Lithuania. All additional means (optimization of crop structure, changes in growing technologies) reduce the reliable harm of extreme climate change, but only technical, organizational means (crop insurance) can mostly reduce the loss of production. The investigation was underway using the analysis of scientific literature. Crop producers' expectations of risk mitigation are influenced by a variety of factors: age, farm size, farming duration, locality, and farming practice. Farmers assess the government's given support by way of compensation insurance fees. Farmers analyze the risk of the meteorological phenomenon and indicate that the farm would have huge damage from adverse climate conditions. The main obstacles to crop insurance are these: the farmers are too small for the insurance system; they want to separate risks insurance and to attain more possibilities to choose from; accent development of evaluation and payment of harms after agreeing that the evaluation is objective.

Keywords: crop insurance; climate change; risk management



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1. Introduction

The role of insurance in global economics is very important because it provides a risk management possibility that is both necessary for business and for other daily activities and contributes to the vitality of the economic activity in this way. Insurance is an important and growing part of the financial sector in almost all developed and developing economies. Compared with other foreign counties, the Lithuanian insurance market is still young and developing, so it has a high potential for growth. The activity of insurance is both significant to a concrete person and to the state. The person that is insured against any risk can feel safe because the losses will be compensated in case of an insured event. In the aspect of the state, the insurance activity encourages the growth of economics, creates places of work, fills the state budget with contributions, and has a positive impact on the development of the country.

The frequency of adverse weather events and the resulting economic losses have steadily increased over the past few decades [1]. Agriculture has been recognized as particularly sensitive to climate change [2].

Arshad etc. [3] announced an important yet often ignored impact of climate variability on agricultural systems, namely that farmland value may decline with increasing temperatures. Forecasts for the future also show that farmers in many parts of the world will face increasingly difficult agricultural production conditions with warmer environments, pest invasion, increasingly irregular rainfall, and more frequent extreme natural events [4].

and an increasing number of countries around the world will face food shortages and the need to import it [5]. Thus, the effect of climate change is clearly detrimental both to the world's population and to farmers in all areas of agriculture, and these conditions are not subject to natural risk factors. On the other hand, Chavas J.P. [6] determined how improved agricultural technology helped reduce the adverse effects of climate change on food production and food security in Italy. Farmers feel the instability of their activities due to the potential loss of income, and the risk of income planning alone increases due to the above-mentioned challenges. The global climate tends to increase the losses of agribusinesses [7], so a well-developed crop insurance business may be the only way to cover unplanned losses at least partially [8]. According to scientists, global contributions of crop insurance make up about 70% of all insurance contributions, and it is the most important insurance product in the agricultural sector. The investigation in Bangladesh shows that land ownership, family size, off-farm income, farmers' group, and access to information and extension services influenced the demand for insurance [9]. The demand for insurance services is one of the elements of the insurance market that is especially complicated to assess. The demand for insurance services is related to insurance risk: it is a potential need for residents and companies to be protected against various risks. In order to provide proper services, it is necessary to analyze the expectations and needs of service receivers and know the reasons that encourage/do not encourage them to beware of various risks.

Aim of the work—to analyze the expectations of the participants of the crop insurance system and to reveal the reasons that encourage/do not encourage farms to insure crops in Lithuania.

Tasks of the work:

1. To analyze the theoretical expectations of the participants of the crop insurance system.
2. To reveal the reasons that encourage/do not encourage farms to insure crops.

2. Materials and Methods

The methods of grouping, synthesis, comparison, and analysis of scientific and statistical information sources, as well as the survey of respondents, were used to achieve the aim and tasks.

The essence of the data analysis method is the analysis of empirical research data based on mathematical and statistical methods.

The method of comparison is understood as a thinking operation, a mental juxtaposition, and an evaluation of several objects. It is closely related to the similarity of the methods of analysis and synthesis. The method of comparison is used in this paper to evaluate the experience of settling meteorological phenomena in European countries and the experience of crop insurance in Lithuania.

The work uses the scientific literature to perform problem-based, critical-comparative, or theoretical-conceptual analysis methods of analysis of company documents. The experience of settling losses caused by meteorological phenomena in the European Union countries and the experience of crop insurance in Lithuania were analyzed.

Data collection methods: standardized written surveys. The expectations of the system participants and the reasons that encourage/discourage farms to insure their crops in Lithuania are revealed. The survey questionnaire was constructed based on the questionnaire developed by [10], with new items added separately to reflect the current realities. The survey questionnaire was constructed based on the recommendations of [11] and other scientific literature.

The questionnaire consists of questions on the demographic data of the respondents (place of residence, age, length of service, etc.) and questions in a recital format, corresponding to the various objectives of the study (Appendix A.1). The questionnaires were identical for respondents with and without crop insurance.

The questionnaires were sent to farmers by e-mail and by post. The survey was carried out between July and August 2016. A total of 193 questionnaires were distributed

to farmers, and 135 were returned. The return rate was 69%. Of these, 12 were incorrectly filled in (personal details not provided, questions omitted, many blanks left).

Data processing methods: the collected data were processed using SPSS 22.0 for Windows computer program for static data analysis, and Excel 2010 was used for graphical analysis. Depending on the nature of the variables, appropriate statistical methods were applied: correlation analysis and descriptive statistical methods: percentages, means, and standard deviation.

3. Literature Review

The warming of the climate system is ambiguous. Changes that were not noticed for centuries have been observed in decades since the 1950s. The atmosphere and the oceans have become warmer, the areas of snowfields and glaciers have decreased, and the concentration of greenhouse gas has increased [12]. Babakholof S. et al. [13] established that an increase in warming is harmful, but precipitation has a beneficial effect on the production of wheat farmers, while the production of cotton-growing farmers suffers from excessive rainfall. The interaction impacts of irrigation amounts and climate variables were found to have highly significant effects on the total yields of wheat and cotton-growing farmers, indicating that farms with sufficient irrigation systems are more resistant to climate threats.

The number of natural disasters is also increasing with climate change (Figure 1). The number of natural disasters in Europe has increased since the 1990s. The number of global natural disasters is three times bigger compared with that 40 years ago, and the economic losses have increased by five times. Presently, the number of insurance damages per year is equal to the number of all the damages per decade of the 1960s. Presently, there is just a partial or no possibility of using insurance services in the regions that are devastated heavily [14].

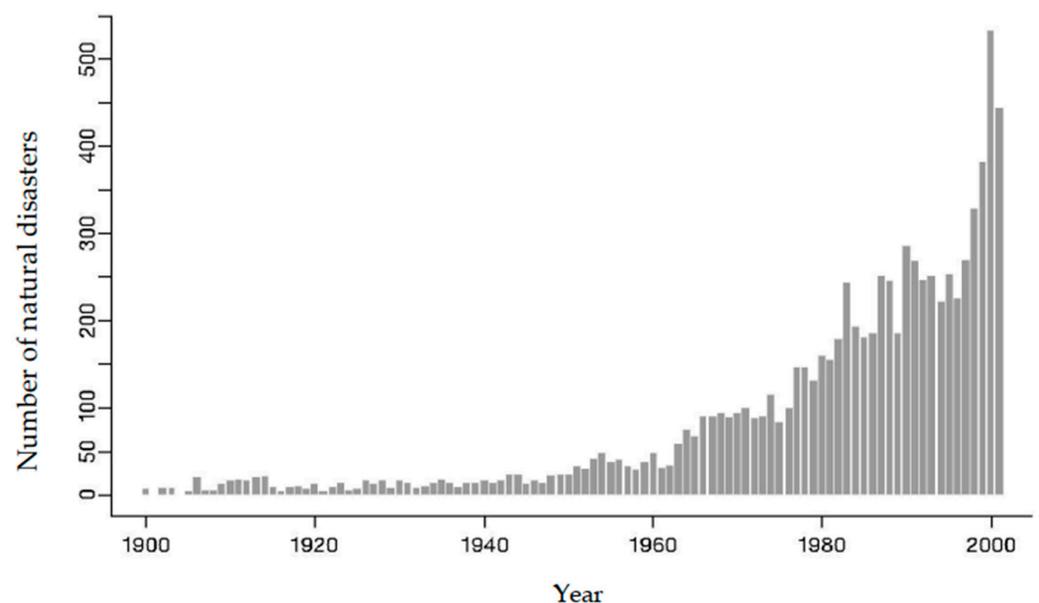


Figure 1. Number of natural disasters in Europe in 1900–2002 [15].

The crop production risks associated with climate change are frost, drought, excess and deficient precipitation [16]. The scientific literature [16,17] suggests that medium and small farms are vulnerable to the effects of climate change and variability and that these risks will invariably lead to higher losses. According to [18], climate change will increase the demand for irrigation in many regions of the world, influenced by reduced precipitation and evaporation. The researchers in [19] state that reduced water availability and adverse meteorological conditions will reduce plant species diversity and yields. It is likely that in some regions, there will be a reduction in traditional crops. According

to [20], an increase in temperature of at least one to two degrees may have a negative impact on yields. According to [21], this can be particularly damaging for farmers in southern regions, as temperature changes increase the likelihood and severity of extreme meteorological events. According to [22], in Europe, the Mediterranean, Southern and Central European regions are the most vulnerable to climate change. These regions are expected to experience the greatest negative impacts from climate change. According to Lithuanian scientists [16,18], Lithuania is regionally equally sensitive to the negative impacts of extreme climate change phenomena on crop production, and thus all regions may be equally affected by climate change.

The conditions of the Lithuanian climate have changed slowly over 20 years. Although climate changes can be different in different Lithuanian regions, in general, changes can be noticed everywhere. The tests of soil freezing depth have shown a decrease in regions with deep soil freezing [23]. When undertaking business or other activities in agriculture, the risk is higher than in other sectors. In contrast to other fields, agriculture depends on the climate and does not depend on the human will only. When undertaking agricultural activities, it is very important to identify and assess risks and manage them properly so that decisions made on a farm are effective and profitable [24,25].

There are some reasons why crop insurance is used more and more widely [26–28]. The global population is increasing, and it creates an increasing need for food. The provision of food must be ensured with all means, and safety and insurance can help here. Farmers are penetrating into commercial agricultural forms gradually. Thus, their dependence on the international market and market price is constantly growing.

Increasing climate change conditions bigger dangers caused by weather conditions. Agriculture is especially subject to climate conditions. As foreign investors are penetrating into agriculture more and more, the demand for their insurance is also increasing. The support to crops is provided by the national budget with the governmental decision.

4. Results and Discussion

The study sought to find out how many times in the last 10 years, crop farmers have been exposed to natural risks (drought, frost, hail, torrential rain, and storms) and what losses the risks have caused to their farms. Figure 2 shows which meteorological risks farmers face most often, the areas of crops that have been damaged, and the frequency with which these risks have affected farmers' fields over the last 10 years.

The survey showed that most farms had been affected by various types of damage (drought, frost, hail, torrential rain, and storms) over the last 10 years. Frost (risk of overwintering) was the most common damage, followed by torrential rain, storm, and hail. According to the respondents, drought caused the least damage to farmers.

Frost damage in winter oilseed rape and winter wheat fields was found to be the most frequent problem for farmers. According to Statistics Lithuania (2015), these crops are the most widely grown in Lithuania and are, therefore, the most likely to suffer losses. Winter oilseed rape has been affected by frost risk by a factor of 2.96 over the last 10 years (up to 30% or more frost damage to winter oilseed rape), while winter wheat has been affected by frost risk by a factor of 2.58 on average (up to 30% or more frost damage to winter wheat). However, it was observed that there were some farms that suffered frost damage more than four times in the last 10 years, and more than one-third of the area was damaged (Appendix A.2). However, a negative correlation was found between farming areas and frost damage in oilseed rape ($0.488 p > 0.05$). It can therefore be concluded that frost damage occurs throughout western Lithuania and that no specific region should be singled out. Frost damage in winter oilseed rape crops has been found to have affected every farmer in Lithuania over the last 10 years. Therefore, it can be concluded that the risk of frost damage in Lithuania is quite frequent, and farmers who grow both winter oilseed rape and cereals need to find ways to protect their fields.

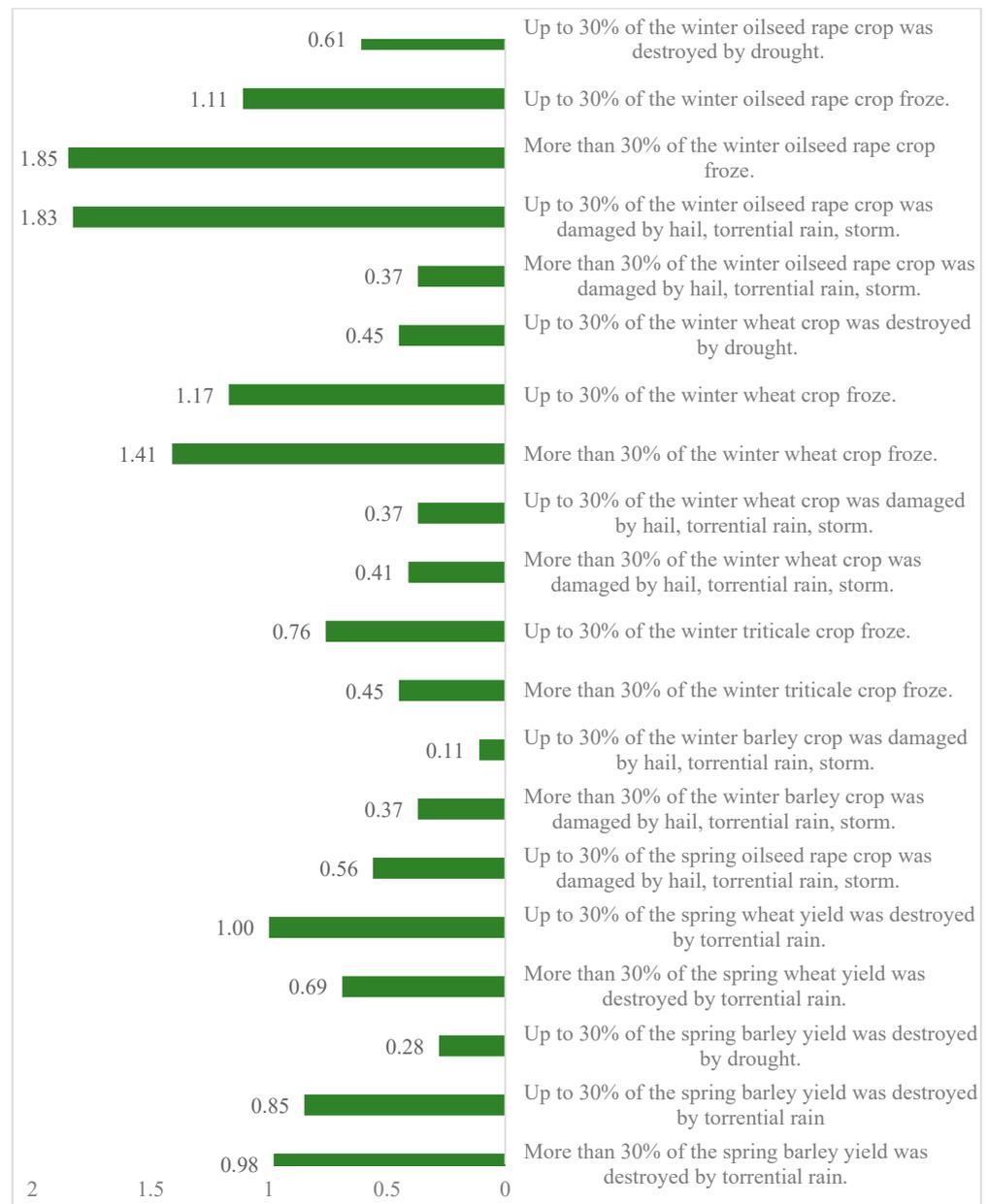


Figure 2. Occurrence of the most common natural risks on farms over the last 10 years.

The study shows that winter oilseed rape has been damaged by hail, heavy rain, or storms quite frequently over the last 10 years. Although the losses are comparatively low at 30%, these risks have occurred on some farms for as many as 6 years in the last 10 years (Appendix A.3). Hail, torrential rain, and storm damage of more than 30% are not very common in winter oilseed rape crops, and the emphasis is more on the risks of hail, torrential rain, and storm causing losses of up to 30% of the yield. A statistically significant relationship was found between the damage of up to 30% in oilseed rape and larger farms (0.481, $p > 0.05$). It can therefore be concluded that larger farms produce more winter oilseed rape and therefore suffer more damage.

Rainfall damage is more frequent in spring barley crops (average of 1.83 over the last 10 years) (Appendix A.9) and in spring wheat crops (average of 1.69 over the last 10 years) (Appendix A.8). It was found that all farmers had experienced heavy rain losses in spring wheat fields, but there were also some farmers who had experienced losses very frequently, even every second year. The same trend is true for spring barley. It can therefore be concluded that when growing more spring crops, it is necessary to constantly think

about protecting the crop against heavy rainfall. This is to point out that these damages can cause losses that are not significant (up to 30%), but their frequency can cause significant yield losses.

Another risk that has reduced farmers' yields over the last 10 years is drought. It has been observed that this risk has affected spring crops (spring oilseed rape, spring wheat, barley, and fields of other cereal) more than winter crops (Appendices A.2–A.11).

The results showed a statistical relationship between farm size and damage in oilseed rape (0.449 $p > 0.05$). It can be assumed that the larger the farm, the more frequent and more varied the damage and the higher the total losses. A statistically significant relationship was also found between winter wheat damage and farm size (0.449 $p > 0,01$). It can be concluded that large farms are more likely to suffer damage than small farms. A negative correlation was also found between damage to wheat and the age of the farmer (-0.394 $p > 0.05$). It can therefore be concluded that winter wheat damage is independent of the age of the farmer and occurs for a large number of farmers. The study showed that there is a correlation between spring barley damage and farm size (0.594, $p > 0.05$). It can be assumed that large farms are more likely to suffer losses as a result of farmers not having time to harvest. There is also a correlation between the damage suffered by spring barley and the length of farming (0.347, $p > 0.01$). This suggests that farmers who have been farming longer have more technological or agronomic knowledge and therefore suffer less damage in these fields.

The survey showed that farmers who have insured their crops are more likely to report the presence of damage in the last 10 years (Appendix A.12). It can be assumed that farmers are more likely to notice damage and monitor and assess the damage on a regular basis. It can be assumed that farmers who have not taken crop insurance in the last 10 years may have forgotten about minor damages and therefore did not report losses.

The main risks faced by farmers in the western part of Lithuania are frost, rain, hail, storm, and drought (Figure 2). Frost, which occurs on average every three years, is the most important cause of losses for farmers, with losses fluctuating between years. However, it can be noted that the incidence may vary from one district to another, with some being less affected and others more affected, but frost as a phenomenon affected the areas of all farmers surveyed. It can be said that meteorological events cause the greatest damage to winter oilseed rape crops, followed by winter wheat, triticale, and spring crops, and summer crops experience less damage. The damage caused by meteorological events is more often observed by farmers who take crop insurance.

4.1. Factors for Choosing Crop Insurance

Crop Insurance Conditions

The study sought to find out what reasons would encourage farmers to increase their use of crop insurance. Figure 3 shows the reasons that are valued by both insured and uninsured farmers.

Summarising the survey data, farmers who have insured or are currently insuring their crops indicate that the main reason why they are currently insuring their crops is to take advantage of the support provided by the government (reimbursement of up to 50% of the crop insurance premium), which is very important for all farmers. It was observed that insured farmers assess the risk of meteorological phenomena and also indicate that adverse weather conditions would result in significant losses to the farm, and this is a very important reason for using crop insurance. According to the farmers who take crop insurance, agriculture is a business, and therefore, it is important to manage risks and minimize crop losses caused by nature. These three reasons are the main drivers for farmers to actively use crop insurance products. The least important reasons that would encourage farmers to take crop insurance are the compulsory nature of short-term (an average of 1.27), long-term (an average of 1.27) bank loans, or the Rural Development Programme (RDP) support (an average of 2.21). There was a negative correlation between compulsory insurance when receiving investment support under the RDP and the duration of insurance

(−0.348 **, $p > 0.05$) (Appendix A.13). It could be argued that compulsory insurance is more of a disincentive than an incentive for farmers to insure their crops. It also reveals an association between compulsory insurance for short-term and long-term bank loans and the duration of insurance (0.804 **, $p > 0.05$). It can be argued that although it will be compulsory to insure crops, according to the farmers, it would not really be an incentive but simply a compulsory thing to be performed. Therefore, it can be assumed that former customers may not continue to insure their crops after the end of their contracts.

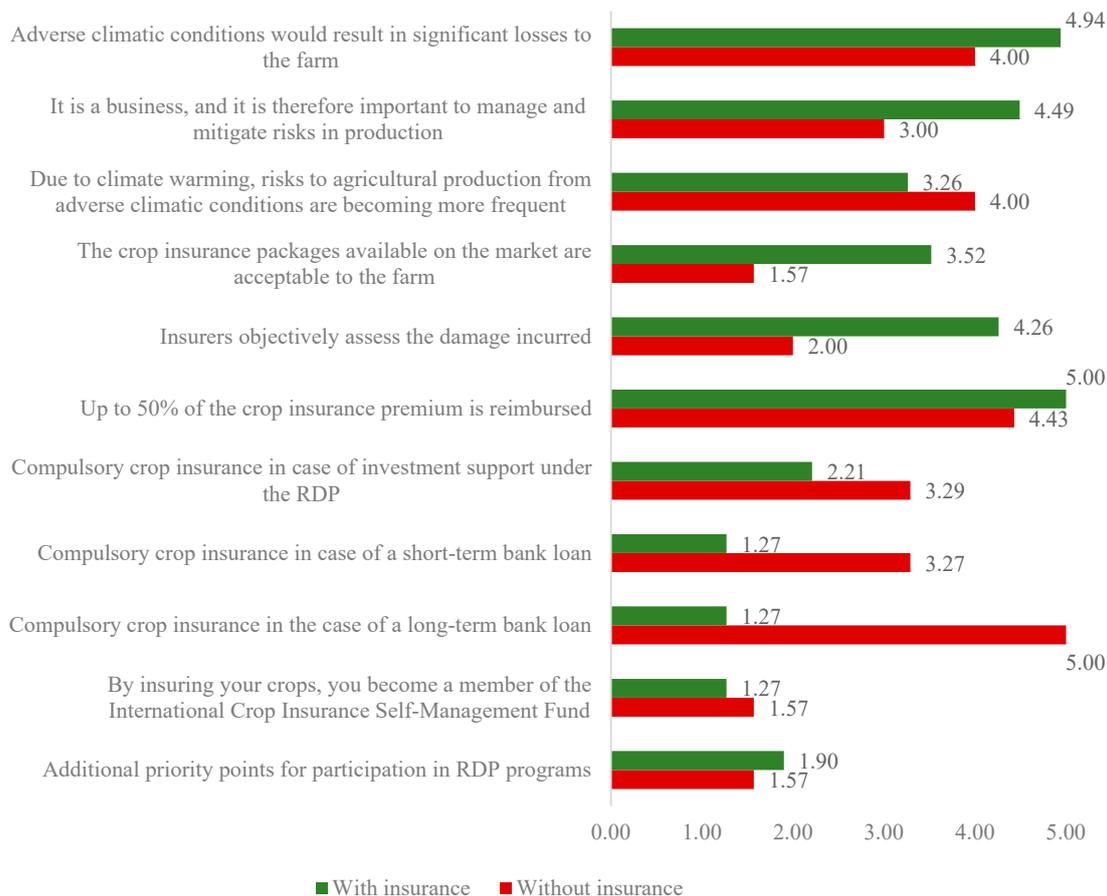


Figure 3. Reasons for farmers to take crop insurance.

The study sought to find the reasons why farmers are hesitant to take crop insurance. Figure 4 shows the main reasons given by farmers who insure their crops and the opinion of farmers who do not insure their crops against meteorological events.

When discussing the reasons for hesitating to insure their crops, it is observed that farmers who insure their crops and farmers who do not insure their crops express different motives and reasons for hesitation. According to farmers who use crop insurance services, it is important for them to be given the possibility to insure particular groups of crops. According to farmers, it would be important for them if other insurance companies started to insure crops in Lithuania, as currently, there is only one insurance company in the crop insurance market. Those farms that do take insurance state that they are too small to use the crop insurance system. According to existing customers, they are also hesitant because the market offers a comprehensive insurance package. Farmers would like to break this down and have more choices. Farmers who do not use crop insurance services say that the main reason why they do not use crop insurance services is that the farms are too small to pay for crop insurance. According to farmers, they are less likely to suffer losses due to unfavorable climatic conditions. According to farmers who did not take crop insurance, an important reason why they hesitate to take it is that the insurance company’s assessor finds the loss lower than the actual loss (an average of 3.67) and the insurance company

does not cover the full value of the loss (does not pay out the full amount for the loss) (an average of 3.72). The main differences are that farmers who insure crops put more emphasis on the possibilities to improve the crop insurance system, while farmers who do not insure crops put more emphasis on the reasons they find relevant why they do not need to protect their farm or on problems in the insurance system, such as the assessment of damages, the coverage of damages, although they do not insure their crops and have not personally experienced these reasons. Therefore, it can be assumed that the services provided are adequate, as according to the farmers who take insurance, they cite this as a moderately important reason. It is also noted that farmers also differ in their assessment of losses caused by adverse climatic conditions.



Figure 4. Reasons why farmers are hesitant about crop insurance.

Farmers who take crop insurance consider their losses to be higher, while farmers who do not take crop insurance consider their farms to be less likely to suffer losses. This suggests that farmers have different perceptions of farm losses and their consequences for the future of the farm. According to the average, the most important reason for not insuring crops is that direct payments cover the losses incurred. However, farms that do take insurance consider this to be a minor reason for hesitation.

Farmers who use the insurance scheme and those who do not express different reasons for hesitating to insure their crops.

Farmers who do not insure their crops indicate that the main reason that would encourage them to insure their crops would be mandatory insurance (an average of 5.00). According to the farmers, they would insure their crops if asked by a bank for a long-term loan. It is also important to take advantage of state support, which is currently only

available to insured farmers (an average of 4.43). A third important reason that would encourage them to insure their crops is that the risk of agricultural production due to climate warming is becoming more frequent due to the risk of adverse climatic conditions (an average of 4.00). It can be argued that farmers are constantly monitoring the weather and that continuous climate changes and the severity and intensity of the damage caused by meteorological events would encourage farmers to increase their use of crop insurance. The least motivating reasons for farmers to take out crop insurance relate to the insurance product. The crop insurance packages currently available on the market were found to be the least motivating for farmers to take crop insurance (an average of 1.57). Another reason that would be the least likely to encourage farmers to take crop insurance is becoming a member of an international crop insurance mutual fund (an average of 1.57). It can therefore be argued that farmers who do not use insurance services would be more willing to see a change in the insurance conditions that would give them more choices. Farmers acknowledge that mandatory insurance when taking long-term or short-term loans from a bank would be one of the main motives for taking crop insurance, as well as the desire to benefit from the support currently provided by offsetting part of the insurance premium. Farmers who have never been insured acknowledge that the constant changes in climate and the intensity and damage caused by meteorological events would be an important motivation to start using crop insurance.

4.2. Does the Age of the Farmer Play a Role in the Decision to Protect Crops?

The results of the study show that the reasons for taking crop insurance depend on the age of the farmer, the size of the farm, and the length of farming (Table 1).

Table 1. Statistical relationships between reasons for crop insurance and farmers’ age, farm size, and length of farming.

Block of Reasons to Take Crop Insurance	Age	Duration of Farming	Farm Size
Pearson Correlation	0.224 *	0.381 **	0.491 **

Note: the averages of treatments marked with * denote significant differences, $p < 0.05$; ** denote significant differences, $p < 0.01$.

The study revealed a statistically significant relationship between the block of reasons for crop insurance and the age of farmers (0.224 **, $p < 0.01$). It can be assumed that the older the farmers are, the more likely they are to ban crops. There is also a correlation between the length of farming and the reasons for encouraging crop insurance (0.381 **, $p < 0.05$). It can be argued that the shorter the duration of farming, the more farmers seek to protect themselves against meteorological events. It can be argued that the duration of farming is more frequent for younger individuals, but it was observed that new farmers entering the crop production field tend to protect themselves more against natural risks. It can be assumed that younger and less experienced farmers are more likely to insure and manage risks related to natural phenomena than older and more experienced farmers. There is also a correlation between reasons for taking insurance and farm size (0.491 **, $p < 0.05$). It can be argued that farmers or other farm operators with larger areas are more likely to protect their crops than small farms.

The study sought to find what specific reasons encourage or would encourage farmers according to age, length of farming, and farm size. The reasons that encourage farmers of different ages to insure their crops were identified (Figure 5).

The importance of crop insurance premium reimbursement for all farmers was revealed. Older customers recognize that it is most important for them to keep their business safe and minimize losses, so it is important that insurers assess claims objectively and provide suitable packages to protect their crops. Younger farmers recognize that it is important for them to avoid losses and benefit from support. It can therefore be argued that the main reasons for taking crop insurance are similar across age groups.

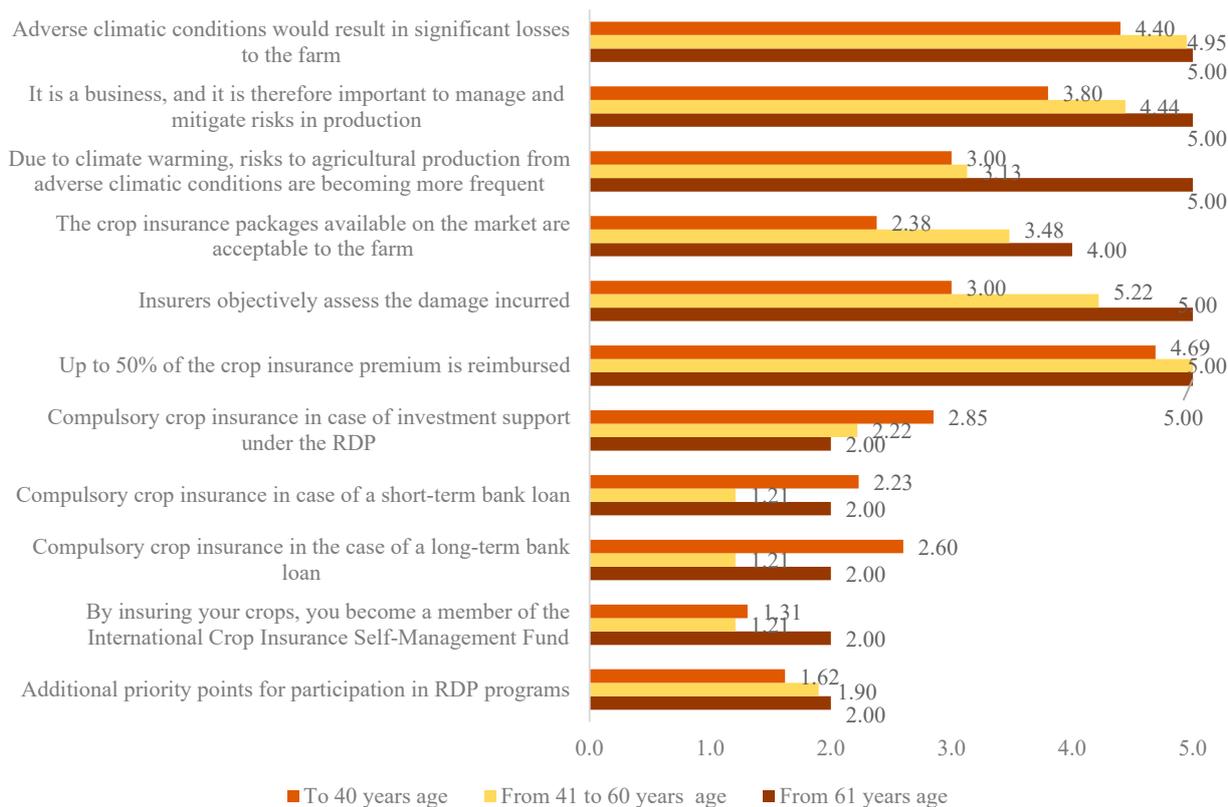


Figure 5. Reasons for farmers of different ages to take crop insurance.

It is noticeable that farmers who do not take crop insurance emphasize that crop insurance is not important for the farm because the farm is too small and the farm does not suffer a lot of damage due to meteorological events. It is also pointed out that farmers who have never been insured evaluate the performance of the insurance company: the work of the claim experts and the insurance company’s compensation system. It can be assumed that they are not well acquainted with the activities of the insurance company and rely on unconfirmed sources. Farmers who currently insure crops stress the need to look for ways to improve the insurance product to cover individual crops and to find new players in the insurance system. The reasons for the hesitation of farmers of different ages to take crop insurance are given in Figure 6.

The study reveals that older farmers indicate that most of the reasons for hesitation to take crop insurance are important. The most important reasons for hesitation are the following: the farm is too small to make it worthwhile, and the activities related to the insurance company and the product provided; there is only one crop insurance company in Lithuania, which is a monopolist in the insurance market, so there is no choice (an average of 5); the insurance company does not cover the full value of the loss (does not pay out the full amount of the loss) (an average of 5); the insurance company’s assessor underestimates the actual loss (an average of 5); and there is no possibility to insure single crops (an average of 5).

Younger farmers indicate that these reasons are not very important in their decision-making. The most important reasons for hesitation are the following: no possibility to insure individual crops (an average of 3.80); the farm would not suffer significant losses due to adverse climatic conditions (an average of 3.29); the farm rarely suffers significant losses due to adverse climatic conditions (an average of 3.20). All other risks are of low importance and do not raise any major issues.

The reasons given by middle-aged farmers are of moderate importance. The most important reasons are: the farm is too small to be worth insuring (an average of 3.84); the

farm would not suffer significant losses due to adverse weather conditions (an average of 3.71).

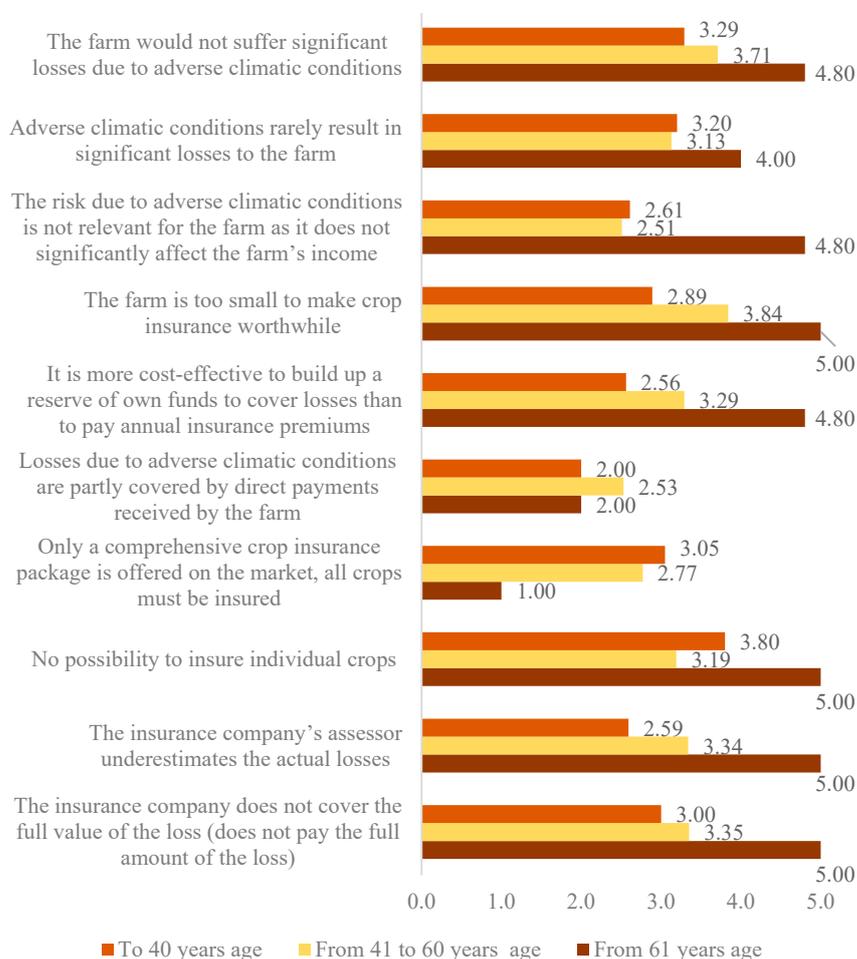


Figure 6. Reasons why farmers of different ages are hesitant about crop insurance.

The reasons for hesitating to take insurance are very similar among farmers. However, older farmers report more reasons for hesitation than younger farmers. There is a need for a regular presentation of the services provided, especially to older farmers, as the activities of the current insurance company and the insurance product provided are particularly emphasized.

4.3. Expectations of the Participants of the Crop Insurance System

An active discussion about crop insurance started in 2006 after the elemental drought [16,29]. The risks that cause the biggest damage to agricultural crops in Lithuania are insured presently. The private sector and the national sector apply for the insurance contribution compensation and reinsurance system cooperate in the field of agricultural insurance in Lithuania. It is stated that this system is especially effective, and it is applied in the EU states to the widest extent [29,30]. It is only possible to develop an effectively operating crop insurance system thanks to close cooperation among farmers, insurance companies, and the state [16,29]. It is important to understand and determine what all the interested participants expect from the crop insurance system (Table 2).

The necessity for the analysis of income insurance possibilities of the farm is emphasized, especially when looking for possibilities to cover losses to a greater extent than is allowed now. The most important thing to the authorities, farmers, and insurers is the objectiveness of loss assessment and correct compensation of insurance amounts for

suffered losses. The results of the market in Lithuania in 2010–2021 show the growing trust in the activity of crop insurance (Table 3).

Table 2. Expectations of the participants of the crop insurance system.

Participants	Expectations
States	the developed loss regulation system would offer the possibility to plan the need for budget assignments; effectiveness of the system; decrease the impact of unfavorable natural conditions on the income of farms; the state is interested in the creation of assumptions to reduce the insurance contribution level; development of the objective damage assessment system, assurance of justice and timeliness of damage compensation; purposeful formation of farmers' trust in the developed system
Farmers	avoidance of the influence of severe unfavorable hydro-meteorological phenomena on the fertility of crops and income of the farm when using the services provided by the system; objectiveness of the assessment of losses and correct insurance amount for the suffered losses; involvement of the damage assessors that are selected by farmers and trained appropriately in the damage assessment process;
Insurers	offering attractive insurance products to farmers with the purpose to obtain their trust and support; assurance of operative and objective assessment of separate risk manifestation cases and payment in case of losses

Table 3. Crop Insurance Results of the market in Lithuania 2010–2021.

Year	Indexes	Number of the Insured Farms	Area, Ha	Part in the Crop Area, %	Part of Insured Plants in the Crop Area, %	Contribution, EUR	Benefit, EUR	Contribution—Benefit, EUR
2010		410	77,944	3.9	5.5	1,565,960	4,448,158	−2,882,198
2011		682	269,912	13.0	18.7	9,404,101	18,388,913	−8,984,812
2012		354	125,891	5.8	8.2	3,417,700	850,518	2,567,182
2013		441	151,857	6.9	9.5	4,043,177	1,064,249	2,978,928
2014		586	211,101	9.3	12.8	4,158,915	4,763,752	−604,837
2015		628	199,607	8.4	11.9	4,791,049	537,533	4,253,516
2016		720	219,705	9.5	13.2	5,654,693	1,601,503	4,053,190
2017		641	201,232	8.5	12.1	5,481,932	1,286,667	4,195,265
2018		657	190,488	8.1	11.4	4,559,718	2,689,742	1,869,976
2019		965	266,012	12.9	18.4	8,147,597	3,030,510	5,117,087
2020		1377	321,415	16.1	21.4	8,932,979	8,464,623	468,356
2021		1933	418,507	18.9	25.5	11,980,982	9,403,845	2,577,137

It can be stated that crop insurance increased the number of insured areas by five times in the period of twelve years (part of insured plants in the crop area from 5.5 to 25.5%). In 2006, the only company that executed the crop insurance activity only insured 0.5% of all the crops [31]. The crop insurance service has increased by over 70 times in respect of the areas insured in Lithuania. It can be stated that farmers have appreciated the efforts of the specialized insurance company and show more and more trust in it. It can also be argued that crop insurance activity is not profitable in Lithuania, and there are a lot of insured events.

Compiled by the author according to the data of VH Lietuva

Small farms (Figure 7a) of 30–50 ha (94%) are dominant in Lithuania according to the structure of farms. However, crops are insured in Lithuania by bigger farms. According to the insured area and the number of customers, the average insured farm is 317 ha. It can be stated that bigger Lithuanian farms are more interested in the crop insurance system. Share of insured corn and rape crops according to the districts: 54.1% in Joniškis district, 41.7% in Kėdainiai district, 42.4% in Šakiai district, 40.2% in Šiauliai district, 36.9% in Pakruojis district. It can be stated farmers of fertile lands insure crops more often.

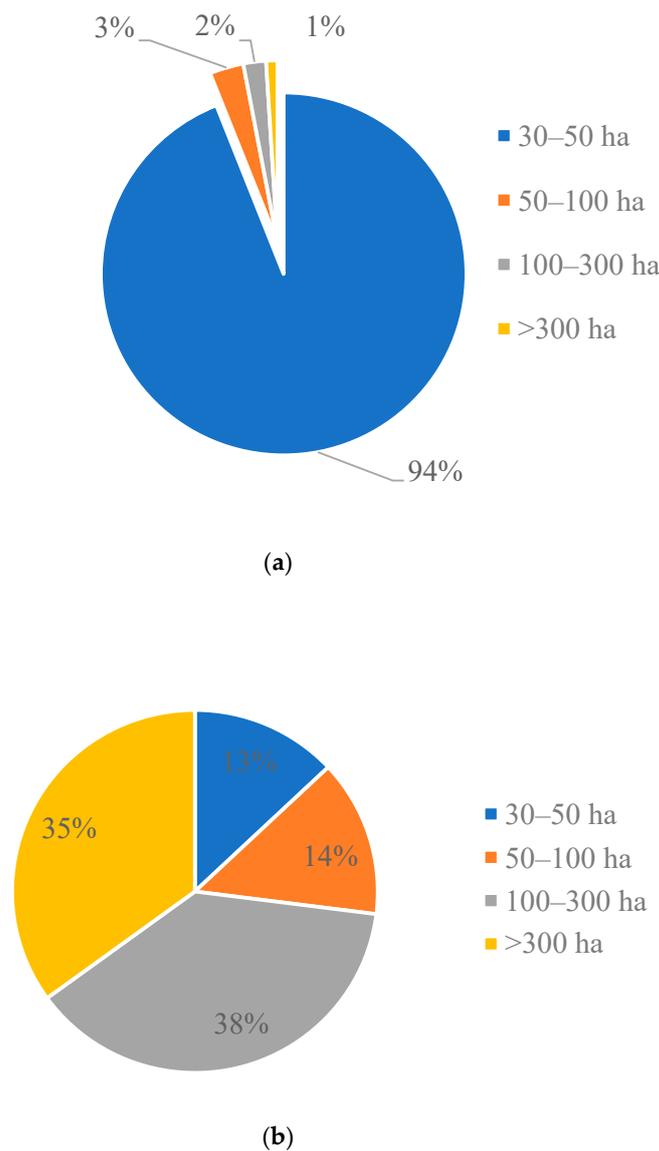


Figure 7. (a) Structure of farms in Lithuania in 2018 [28]. (b) Structure of farms that insure their insured their crops in 2020.

Reasons that encourage/do not encourage to insure crops are indicated in the literature [32] (Tables 4 and 5).

The respondents of all the groups have indicated that the main reasons are very similar both for big and for small farms: wish to protect themselves from suffered losses; state compensation. Farmers very well understand that agriculture is a business, so it is obligatory to reduce risks in production. It is fine that farmers appreciate the efforts of insurers to control the damages properly. It can be argued that the main principle of insurance—trust in each other—is implemented. It should be emphasized that small farms accentuate obligatory crop insurance after receiving investment support. It can be supposed that farmers are not very interested in changed insurance conditions, and they are not served by insurance consultants properly. It can be noticed that crop insurance packages that are offered now are acceptable to big farms. However, it can be stated consultants of the insurance company are oriented to big farms and provide them with information that is updated yearly, but the information is provided more seldom to small farms or is not provided at all.

Table 4. Reasons that encourage farms to insure crops.

Size of farms	Arguments
Farms up to 50 ha	The farm would suffer big losses due to unfavorable climate conditions; The granted compensation of the crop insurance contribution is up to 50%; It is obligatory to insure crops after getting the investment support according to KPP; It is business, so it is important to control and reduce the risk in production; Insurers assess the suffered damage objectively
Farms from 50 to 300 ha	The granted compensation of the crop insurance contribution is up to 50%; The farm would suffer big losses due to unfavorable climate conditions; It is business, so it is important to control and reduce the risk in production; Insurers assess the suffered damage objectively
Farms from 300 ha and bigger ones	The granted compensation of the crop insurance contribution is up to 50%; The farm would suffer big losses due to unfavorable climate conditions; It is business, so it is important to control and reduce the risk in production; Insurers assess the suffered damage objectively; The crop insurance packages that are acceptable to the farm are offered in the market

Table 5. Reasons that do not encourage farms to insure crops.

Size of Farms	Arguments
Farms up to 50 ha	The farm is too small to insure crops; It is better to accumulate the own financial reserve to cover losses than pay insurance contributions every year; There is only one crop-insuring company in Lithuania; There is no possibility to insure individual kinds of crops
Farms from 50 to 300	There is no possibility to insure individual types of crops; There is only one crop-insuring company in Lithuania; The market only offers complex crop insurance packages, and it is obligatory to insure all the crops; It is better to accumulate the own financial reserve to cover losses than pay insurance contributions every year;
Farms from 300 ha and bigger ones	There is no possibility to insure individual kinds of crops; There is only one crop-insuring company in Lithuania; The assessor of the insurance company sets lower losses than those suffered; The insurance company does not cover the total value of suffered losses (it does not pay the total amount for suffered losses)

It was noticed that small farms accentuate the size of the farm as the main reason for not wanting any insurance. It is reflected in the structures of insured farms very well. The share of small farms in Lithuania is 94%, and just 1.66% of farms of 30–50 ha protect their income. They state that the best way of self-protection is to accumulate the reserve. Bigger farms want more flexibility from the product—possibilities to insure individual kinds of crops because just a complex insurance package is offered now. All the farms accentuate the absence of competition. The farms that control 300 ha and more accentuate the improvement of damage assessment, although they agree the assessment is objective.

5. Conclusions

- Lithuanian farmers experience the most losses due to frost, which occurs on average every third year and causes harvest losses of various sizes. Meteorological events cause the greatest damage to winter rapeseed crops, followed by damage to winter wheat, triticale, and smaller losses are related to summer crops due to rain, hail, and storms. Farmers suffer the least losses due to drought. Farmers in Lithuania are offered crop insurance products against meteorological phenomena that best meet customer expectations.

- In order to avoid losses and help adapt to climate change, it is necessary to focus more on implementing preventive measures to prevent damage from meteorological phenomena. In order to meet the respondents' expectations, it would be appropriate to apply technical and organizational measures that help to reduce the negative consequences of extreme climate change events for crop production. Adopt the experience of European Union countries and expand crop insurance activities.
- To strengthen the cooperation between the private and public sectors of Lithuania, cooperating in the field of agricultural insurance by applying the insurance premium compensation and reinsurance system. An efficient crop insurance system can only be created through the flexible cooperation of farmers, insurance companies, and the state.
- It is necessary to take into account the socio-demographic characteristics of consumers because they directly determine the reasons for banning or not banning crops. It can be said that knowing the socio-demographic characteristics of consumers can be used to adapt insurance services.

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Appendix A

Appendix A.1

Questionnaire for Farmers

ASSESSMENT OF THE INFLUENCE OF METEOROLOGICAL CONDITIONS ON CROP PRODUCTION IN THE REGION OF WESTERN LITHUANIA

Survey	<p>The survey aims to collect information from farmers on the risks in crop production due to adverse climatic conditions and their management through crop insurance.</p> <p>Survey method: questionnaire.</p> <p>Survey period: 15 August 2016 to 15 September 2016</p>
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1. In which county Is your farm located? (Please fill in)

Šiauliai county	Tauragė county	Telšiai county	Klaipėda county

2. What Is your age (in years)? (Please indicate the age range with a "+")

Under 30	31 to 40	41 to 50	51 to 60	61 to 70	over 71

2.1. Please indicate how many years you have been farming

3. What is the size of your farm (ha)? (Please indicate the range of farm size with a "+")

Under 20 ha	21 to 50 ha	51 to 100 ha	101 to 300 ha	301 to 500 ha	501 to 1000 ha	over 1001 ha

4. What agricultural activities do you carry out? (Please indicate the correct answer option(s) with a “+”

Growing cereal and oilseed rape	Livestock farming	Mixed crop-livestock farming

1. 1. How many times in the last 10 years have you encountered the following natural risks in crop production? (Please indicate a number from 0 to 10; where 0 means *I have not been exposed in any year* and 10 means *I have been exposed every year*. Please tick only for the crops grown on the farm and the risks you have encountered at least once in the last 10 years)

Crops cultivated on the farm <i>Type of risk</i>	Winter Crops					Spring Crops			
	Oilseed rape	wheat	triticale	rye	barley	Oilseed rape	wheat	barley	Other cereal
Up to 30% of the crop yield was destroyed by drought									
More than 30% of the crop yield was destroyed by drought									
Up to 30% of the crop froze						X	X	X	X
More than 30% of the crop froze						X	X	X	X
Up to 30% of the crop was damaged by hail									
More than 30% of the crop was damaged by hail									
Up to 30% of the crop was destroyed by torrential rain									
More than 30% of the crop was destroyed by torrential rain									

2. Do you insure your crops? If yes, please also indicate how often? (Please indicate the correct answer with a “+”.

	Insured or not insured	Every year (for less than 3 years)	Every year (for 3–8 years)	Every year (for more than 8 years)	Not every year, only after significant losses	Not every year, for other reasons
Yes						
No		X	X	X	X	X

3. Please indicate the reasons that motivate you to insure the crop, scoring how important it is for your farm (1—not important, 2—not very important 3—moderately important, 4—important, 5—very important). Mark the correct answer with a “+”.

	1 Not important	2	3	4	5 Very important
Adverse climatic conditions would result in significant losses to the farm					
It is a business, and it is therefore important to manage and mitigate risks in production					
Due to climate warming, risks to agricultural production from adverse climatic conditions are becoming more frequent					
The crop insurance packages available on the market are acceptable to the farm					
Insurers objectively assess the damage incurred					
Up to 50% of the crop insurance premium is reimbursed					
Compulsory crop insurance in case of investment support under the RDP					
Compulsory crop insurance in case of a short-term bank loan					
Compulsory crop insurance in the case of a long-term bank loan					
By insuring your crops, you become a member of the International Crop Insurance Self-Management Fund					
Additional priority points for participation in RDP programs					

4. Please indicate the reasons why you are hesitant to insure the crop, scoring how important it is or could be to your decision (1—not important, 2—not very important 3—moderately important, 4—important, 5—very important). Mark the correct answer with a “+”.

	1 Not important	2	3	4	5 Very important
The farm would not suffer significant losses due to adverse climatic conditions					
Adverse climatic conditions rarely result in significant losses to the farm					
The risk due to adverse climatic conditions is not relevant for the farm as it does not significantly affect the farm's income					
The farm is too small to make crop insurance worthwhile					
It is more cost-effective to build up a reserve of own funds to cover losses than to pay annual insurance premiums					
Losses due to adverse climatic conditions are partly covered by direct payments received by the farm					
Only a comprehensive crop insurance package is offered on the market, all crops must be insured					
No possibility to insure individual crops					
Only one crop insurance company in Lithuania, which is a monopoly on the insurance market, has no choice					
The insurance company's assessor underestimates the actual losses					
The insurance company does not cover the full value of the loss (does not pay the full amount of the loss)					

Thank you very much for your answers.

Appendix A.2

Occurrence of natural risks in winter oilseed rape areas on farms over the last 10 years

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop froze	More than 30% of the crop froze	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.60	0.30	0.88	2.17	2.20	0.57	0.30	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	2 years	1 year	2 years	4 years	6 years	2 years	1 year	I haven't encountered it in any year
	Standard deviation	0.92	0.46	0.84	1.46	1.26	0.90	0.46	0.00
I do not insure	Average	0.63	0.00	1.53	1.25	1.13	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	4 years	I haven't encountered it in any year	3 years	3 years	3 years	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	1.476	0.00	1.41	1.41	1.26	0.00	0.00	0.00
Total	Average	0.61	0.20	1.11	1.85	1.83	0.37	0.20	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	4 years	1 year	3 years	4 years	6 years	2 years	1 year	I haven't encountered it in any year
	Standard deviation	1.13	.399	1.11	1.50	1.35	0.780	0.399	0.000

Appendix A.3

Occurrence of natural risks in winter wheat areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop froze	More than 30% of the crop froze	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.60	0.00	1.08	1.42	0.57	0.40	0.17	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	2 years	I haven't encountered it in any year	2 years	3 years	2 years	2 years	2 years	I haven't encountered it in any year
	Standard deviation	0.924	0.000	0.962	0.962	0.909	0.807	0.557	0.000
I do not insure	Average	0.16	0.00	1.34	1.41	0.00	.44	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	3 years	4 years	I haven't encountered it in any year	2 years	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.369	0.000	1.208	1.563	0.000	0.840	0.000	0.000
Total	Average	0.45	0.00	1.17	1.41	0.37	0.41	0.11	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	2 years	I haven't encountered it in any year	3 years	4 years	2 years	2 years	2 years	I haven't encountered it in any year
	Standard deviation	0.803	0.000	1.055	1.197	0.780	0.814	0.456	0.000

Appendix A.4

Occurrence of natural risks in winter triticale areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop froze	More than 30% of the crop froze	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.00	0.00	0.89	0.60	0.00	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	3 years	2 years	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.000	0.000	1.385	0.923	0.000	0.000	0.000	0.000
I do not insure	Average	0.00	0.00	0.37	0.00	0.00	0.00	0.26	0.26
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	1 year
	Standard deviation	0.000	0.000	0.496	0.000	0.000	0.000	0.452	0.452
Total	Average	0.00	0.00	0.76	0.45	0.00	0.00	0.07	0.07
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	3 years	2 years	I haven't encountered it in any year	I haven't encountered it in any year	1 year	1 year
	Standard deviation	0.000	0.000	1.242	0.839	0.000	0.000	0.250	0.250

Appendix A.6

Occurrence of natural risks in winter barley areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop froze	More than 30% of the crop froze	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.09
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	2 years
	Standard deviation	0.000	0.000	0.000	0.000	0.351	0.000	0.000	0.426
I do not insure	Average	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	2 years	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	2 years	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	Average	0.00	0.00	0.00	0.00	0.11	0.37	0.00	0.07
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	2 years	I haven't encountered it in any year	2 years
	Standard deviation	0.000	0.000	0.000	0.000	0.320	0.792	0.000	0.385

Appendix A.7

Occurrence of natural risks in spring oilseed rape areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.00	0.00	0.65	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.000	0.000	0.483	0.000	0.000	0.000
I do not insure	Average	1.25	0.00	0.00	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	2 years	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	1.035	0.000	0.000	0.000	0.000	0.000
Total	Average	0.17	0.00	0.56	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	2 years	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.562	0.000	0.501	0.000	0.000	0.000

Appendix A.8

Occurrence of natural risks in spring wheat areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.00	0.00	0.09	0.00	1.14	0.79
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	5 years	1 year
	Standard deviation	0.000	0.000	0.288	0.000	1.285	0.414
I do not insure	Average	0.63	0.00	0.00	0.63	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.518	0.000	0.000	0.518	0.000	0.000
Total	Average	0.08	0.00	0.08	0.08	1.00	0.69
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	1 year	5 years	1 year
	Standard deviation	0.270	0.000	0.270	0.270	1.260	0.467

Appendix A.9

Occurrence of natural risks in spring barley areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.25	0.00	0.32	0.00	1.14	1.14
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	4 years	4 years
	Standard deviation	0.434	0.000	0.468	0.000	1.004	1.004
	Average	0.33	0.00	0.58	0.47	0.28	0.67
I do not insure	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	2 years	1 year	2 years
	Standard deviation	0.478	0.000	0.500	0.736	0.454	0.717
	Average	0.28	0.00	0.40	0.16	0.85	0.98
Total	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	2 years	4 years	4 years
	Standard deviation	0.449	0.000	0.493	0.475	0.951	0.943

Appendix A.10

Occurrence of natural risks in legume areas on farms over the last 10 years

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.00	0.00	0.25	0.00	0.07	0.16
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	1 year	1 year
	Standard deviation	0.000	0.000	0.434	0.000	0.254	0.373
I do not insure	Average	0.23	0.39	0.23	0.36	0.32	0.36
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	1 year	1 year	1 year	1 year	1 year
	Standard deviation	0.429	0.494	0.429	0.492	0.477	0.492
Total	Average	0.05	0.13	0.24	0.08	0.13	0.21
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	1 year	1 year	1 year	1 year	1 year
	Standard deviation	0.224	0.336	0.431	0.279	0.334	0.410

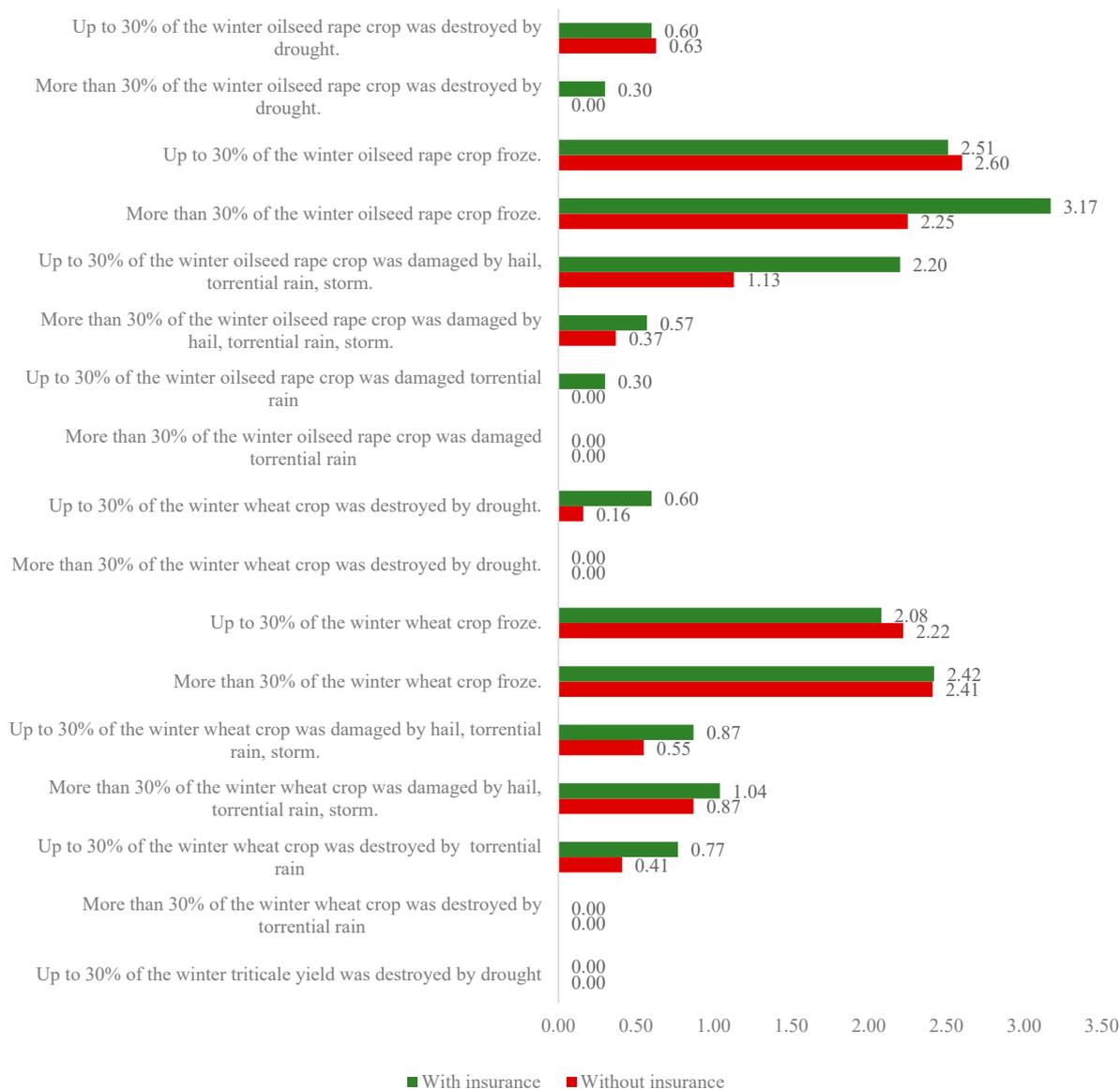
Appendix A.11

Occurrence of natural risks in other cereal areas on farms over the last 10 years.

Do you insure your crops?		Up to 30% of the crop yield was destroyed by drought	More than 30% of the crop yield was destroyed by drought	Up to 30% of the crop was damaged by hail, torrential rain, storm	More than 30% of the crop was damaged by hail, torrential rain, storm	Up to 30% of the crop was destroyed by torrential rain	More than 30% of the crop was destroyed by torrential rain
I insure	Average	0.10	0.00	0.13	0.00	0.58	0.58
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	1 year	1 year
	Standard deviation	0.298	0.000	0.335	0.000	0.501	0.501
I do not insure	Average	0.00	0.00	0.00	0.00	0.00	0.00
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Standard deviation	0.000	0.000	0.000	0.000	0.000	0.000
Total	Average	0.07	0.00	0.10	0.00	0.46	0.46
	Minimum	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year	I haven't encountered it in any year
	Maximum	1 year	I haven't encountered it in any year	1 year	I haven't encountered it in any year	1 year	1 year
	Standard deviation	0.261	0.000	0.303	0.000	0.503	0.503

Appendix A.12

The presence of damage in the last 10 years is more likely to be reported by farmers who have insured their crops.



Appendix A.13

Correlation between obligation and duration of insurance.

	Insurance Period	
It is mandatory to insure crops after receiving investment support according to RDP programs	Pearson Correlation	-0.348 **
	Sig. (2-tailed)	0.002
	N	77
It is mandatory to insure crops after receiving a short-term bank loan	Pearson Correlation	0.804 **
	Sig. (2-tailed)	0.000
	N	77
It is mandatory to insure crops after receiving a long-term bank loan	Pearson Correlation	0.804 **
	Sig. (2-tailed)	0.000
	N	77

Note: the averages of treatments marked with ** denote significant differences, $p > 0.000 > 0.05$.

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