Bulgarian Journal of Agricultural Science, 20 (No 1) 2014, 23-33
Agricultural Academy

KEY FEATURES OF CROP INSURANCE IN SERBIA

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Abstract

ZARKOVIC, N., B. TOSCANO, D. MRKSIC and M. LISOV, 2014. Key features of crop insurance in Serbia. *Bulg. J. Agric. Sci.,* 20: 23-33

Crop insurance differs from other types of insurance coverage. It provides insurance protection for food production, which, being one the preconditions for survival of humanity, has been exposed to numerous devastating natural risks to a considerable extent. Due to its importance, crop insurance has been the subject of various scientific studies, so the literature from this area is extensive. Unlike many other products, the emerging countries are major food producers. That is why the open issues regarding crop insurance are of immense importance to them, too. Serbia is among the countries that have extremely good preconditions for food production. In this paper, the level of development of Serbian crop insurance has been estimated by using the indicators such as coverage of agricultural land by insurance protection, value of production on the insured land, written premium, damaged land, the amount of incurred claims, and loss ratio. The achievements in this line of insurance have also been compared with certain European countries, the majority of which is still undergoing transition, like Serbia. The values of nearly all indicators point to extremely poor development of crop insurance in Serbia. Both the state and the insurance companies should take key role in improving the current situation, which has also been the case in the more developed countries. The analysis conducted in this paper indicates that the state should provide general preconditions for better utilization of insurance, particularly premium subsidies. It is up to the insurance companies to apply the code of practice as consistently as possible, including the state of the art achievements in crop insurance worldwide.

Key words: crop insurance, agricultural insurance, hail insurance, insurance in Serbia

Abbreviations: AIO (Agricultural Insurance Organization), NBS (National Bank of Serbia), SIFB (Sugar Insurance Fund Board), SORS (Statistical Office of the Republic of Serbia)

Introduction

Farming generally takes place in an open and unprotected space, which means that is exposed to various risks. These perils arise almost every year with more or less power, and cause much damage, sometimes even catastrophic in proportion. For that reason, the crop insurance, which plays the important role in economic protection and improvement of farming, is one of the most uncertain lines of insurance. The gravity of perils has also been affected by considerably long cycle, characteristic for crop production. Agriculture is a vital industry in Serbia, which explains why crop insurance has such importance.

In exploring the basic characteristics of crop production in Serbia, first it is necessary to become familiar with the views of the contemporary world literature on this line of insurance. When demand variations for crops and impact of the state, which does not always go in favor of the farmers, add to the divers natural disasters, it becomes obvious that the crop production is exposed to significant financial risks (Carter and Smith, 2007; Morgan et al., 2012). There are many risk management options in agriculture, one of them certainly being purchase of an insurance policy (Chambers and Quiggin, 2004).

Crop insurance has a tradition of almost three centuries. Hail insurance was first arranged in Europe (Germany in 1719, France in 1802, and Great Britain in 1840), and then spread to the United States (USA in 1870) (Swiss Re, 2011a). Today, crop insurance protection is primarily offered for either the restricted range of specified perils such as hailstorm,

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fire and lightning or as comprehensive, i.e. multi-peril crop insurance, which, along with the weather-related perils, also covers production losses caused by other reasons, such as poor yield or poor quality of crop (Wright and Hewitt, 1994; Bennett, 2004; Costello, 2012).

New crop insurance products also play an important role. The essence of the crop- revenue insurance products is in that they combine production and price risks that are the determinants of the total revenue from a certain crop. The index-based insurance products are based on meteorological measurement carried out on a wider area of the insured land. According to this approach, a claim will be paid if, for example, a certain minimum temperature is recorded for a minimum period, or if there has been a certain quantity of rain during a certain period of time, which is used to prove the occurrence of the risk of draught or excessive rain (Roberts, 2005). After the developed countries, these products have also been successfully launched in some of the emerging countries (Swiss Re, 2011b).

There are many issues in the social and economic environmental surroundings that need to be addressed on the way towards viable agricultural development and food production. In view of this, it is the comprehensive crop insurance that stands out as one of important factors from the point of view of the farmers (Porter et al., 2009). Taking into account that hail is among the perils that cause the most severe damages, a demand is being considered not only from the viewpoint of stand-alone hail insurance, but also from that of all-risk insurance. The findings point to a conclusions that, the higher the price or yield uncertainty, the lower i.e. the less favorable the scope of cover granted by the stand-alone hail insurance is (Vercammen and Pannell, 2000).

A contemporary procedure of writing crop insurance recognizes a series of other open issues, such as the rating methods where, for example, it has been explored to what extent deductibles affect the quotes and, consequently, attractiveness of crop insurance. For that purpose, the relationship between the premium and level of coverage with low-deductible policies and high-deductible policies has been subject to analysis (Babcock et al., 2004). It is well known that insurance quotes are also influenced by a discount system that takes into account the claims experience. Application of bonus/malus system has also found its place in crop insurance. The recommended bonuses, depending of the type of the crop, range from 5% to 9% (Rejesus et al., 2006). A process of agricultural production takes place in an open space. Considering that natural disasters do not strike equally throughout the country, it is important to consider such differences when determining the amount of premium. Thus, it makes sense to divide the country into areas, and specify different premium rates for each area (Jong and Heller, 2008).

Many factors encourage the farmers to arrange crop insurance, among which the most important are risk perception and competing risk management tools. According to the research studies in developed countries, the owners of bigger farms, less tenured, and more highly leveraged farms, are more prone to arrange crop insurance (Sherrick et al., 2004). Furthermore, crop insurance shall be bought more for farms that suffered serious damages in the previous period, as their owners became a lot more aware of the degree of risks after such events. The size of the property also has a positive impact on the decision regarding purchasing of a policy, since the insurance would often prove to be too expensive for smaller farms (Enjolras and Sentis, 2011). In addition, the older and more educated the farmers are, the more they are willing to arrange insurance (Finger and Lehmann, 2012). The last stated fact is consistent with the general assumptions about the factors that have a general impact on demand for insurance.

Climate changes also have a significant influence on crop production. Along with the changes in the technology of production, insurance schemes also play an important role in the program of protection against the perils related to climate changes, such as flood and draught. The scope and availability of these schemes often differ from one country to another (Sivakumar and Motha, 2010; Lotze-Campen, 2011). As well as other areas of human activities, crop production, too, proceeds under the threat of catastrophic perils, and climate changes reinforce that threat even more. A growing probability of occurrence of a catastrophic risk causes the insurance premium to raise, level of coverage to decrease, and it can even give rise to a complete collapse of crop insurance market. In such circumstances, a reinsurance program may help establish a market balance (Duncan and Myers, 2000).

Due to the universal importance of food production, crop insurance is widely subsidized by governments of both developed and emerging countries. There is a direct relationship between the involvement of the state and degree of crop insurance development. Cooperation with private sector has long been on in many countries such as the USA, Canada, Spain, Portugal, Italy, and other EU members. In EU, the classic insurance schemes employed by the private sector are widely used, except in Greece and Cyprus, where crop insurance is public and compulsory (Diaz-Caneja et al., 2009). One of the crucial issues of the policy of underwriting crop insurance is the voluntary and/or compulsory element. Based on the data collected from many countries, we can see that the principle of voluntarism is applied most often. Nevertheless, the countries still manage to find the way to encourage the farmers to buy crop insurance (Mahul and Stutley, 2010).

The Spanish pattern of agricultural insurance is considered to be one of the most developed patterns worldwide. By

subsidizing the insurance premium, the state maintains its key role, while the private sector participates in the system by ensuring coverage of risks. Almost half of the premium is subsidized by the Spanish government, and more than 70% of the land under crops have been insured (Burgaz, 2009). The USA, the biggest food producer in the world, also have years of experience in this area (Goodwin and Smith, 1995; Shields, 2011). The farmers are offered the two types of crop insurance, hail insurance and comprehensive crop insurance. Commercial insurers mostly provide the first type, whereas the federal government provides the second type of insurance. The comprehensive crop insurance records a constant loss due to a relatively small number of insures and high claims, which is why it is subsidized by the government (Graham and Xie, 2007). There is another public crop insurance program that has recently been introduced in the USA, called Average Crop Revenue Selection. Some experts think that having two public programs at the same time questions their economic functionality, and suggest that the government support to farmers should undergo serious changes (Babcock, 2010). According to the relevant opinions, the manner of calculation of crop insurance premium should also be subject to major changes (Knight et al., 2010; Rejesus et al., 2010).

It is completely understandable that crop insurance is primarily offered in developed parts of the world. The emerging countries account for as little as 13% of the global crop insurance premium (Roberts, 2005). Taking into account the general growth of the premium in the developing world, we can say that, at present, this share is somewhat increased. The governments of the emerging countries are increasingly providing support to the insurance of crop production, and, in that process, draw upon experiences of the developed countries. One of the crucial issues is introduction of comprehensive crop insurance in the emerging countries, with the aim of expanding the traditional protection (Ray, 1999).

Considering the variety of emerging countries, their different geographic position and climate conditions, it is difficult to provide a general evaluation of the requirements for protection and scope of crop insurance in this part of the world. Public insurance schemes are certainly the most important. However, most of them do not manage to achieve a major breakthrough, and have to put up with continuous underwriting losses due to e.g. high administrative expenses and adverse risk selection. In many countries, particularly emerging countries outside Europe, only 1-3% of arable area is insured (Hatch, 2009; Gulcubuk and Gunes, 2010). Commercial insurance is still underrepresented. Among the factors that may boost its development are trade liberalization and shift from subsistence agriculture to commercial agriculture (Swiss Re, 2007).

The countries in which this line of insurance has good results are those where the state takes an important part. One of the oldest crop insurance programs, which has existed as early as 1946, is the Sugar Insurance Fund Board in Mauritius being the parastatal agency (SIFB, 2012). Furthermore, in 1978, the Agricultural Insurance Organization of Cyprus was established in Cyprus as a parastatal insurance corporation (AIO, 2012). In both cases, the scope of insurance coverage has continually enhanced in line with the farmers' requirements. The special challenge the emerging economies, which have become members of the EU only recently and/or are in the process of EU accession, such as Serbia, are facing refers to development of crop insurance in that context (Vavrova, 2005).

Materials and Methods

The starting material for this paper entails the data on crop insurance in Serbia. According to the current Insurance Law from 2004, it is part of the other property insurance, along with the insurance against machinery breakdown, builders' risks, household insurance, livestock insurance, etc. The National bank of Serbia as a supervisory agency provides only the data on total premium and claims by lines of insurance (NBS, 2012a). We have collected the data on the insured areas, amount of crop insurance, damaged insured areas, and loss ratio in this line of insurance from the companies providing insurance protection of crops production. The data on total, agricultural and arable area in Serbia, the number of farmers, and basic climate data were taken from the Statistical Yearbook of the Republic of Serbia (SORS, 2011). When making comparisons with other countries, we have also used the relevant data for other countries.

In this paper, we have applied both quantitative and qualitative analysis. Out of the numerical data, we have explored a degree of coverage of agricultural areas by insurance protection, the value of production on the insured areas, written premium, damaged areas, incurred damages, and loss ratio. The analysis covers the period from 2006 through 2011. All amounts in Serbian dinars are converted in euros, based on the average annual exchange rate. When interpreting the obtained results by applying the method of comparative analysis, we have linked the current situation in crop insurance to the most important concepts of the researchers of this area in the literature worldwide.

Because of the similar climate and soil, as natural preconditions for development of agricultural output, and similar agricultural and political development, we have compared some of the crop insurance indicators in Serbia with those in Bulgaria, Czech Republic, Hungary, Romania, Slovakia,

Slovenia and Ukraine. In that process, we have used the results of the research supported by the World Bank and the European Commission (Diaz-Caneja et al, 2009; Mahul and Stutley, 2010).

Results

Insurance potential

The Republic of Serbia covers the territory of 8 840 000 ha in total. The agricultural area covers 5 110 560 ha (58%), where the arable area accounts for 3 679 603 ha, and the remaining 1 430 957 ha are covered mostly by meadows and pastures. From the point of view of insurance, only arable land is of importance, since the meadows and pastures are not insured.

The climate is moderately continental, with the average annual temperature of 11 to 12 degrees Celsius. The average air temperature in January is from -1 to +1°C, and in June 22-23°C. The average annual precipitation is 600 to 800 mm in the plains, and 800 to 1200 mm in the mountains. The favorable natural and climate conditions foster agricultural development.

Around 1.3 million of Serbian population lives off agriculture, which accounts for 17.3% the entire population. It is very difficult to provide a general description of agricultural development in Serbia. Although not on enviable level, agricultural output in the most fertile flat regions is far more developed than in mountainous regions. The most frequent crops are maize, wheat, sunflowers, sugar beet, and soft fruit.

In the period under review, the average value of the harvested crops and picked fruits per hectare in the farmers' fields was around 900 €. The value of the total crop production on the arable area is around 3.3 billion €. The total premium that could be generated by insuring crops and fruits on the arable area, with the current composition of crop production, amounts to approximately 130 million €.

Key features of insurance process

In Serbia, there are 11 insurance companies engaged solely in non-life insurance, and six composite insurance companies, dealing with both life and non-life insurance (NBS, 2012b). Two insurers – Dunav and DDOR Novi Sad, generate the absolutely highest share of crop insurance premium. Only a few out of the remaining 15 insurance companies offer crop insurance.

Insurance of crop production in Serbia is on voluntary basis. It is carried out based on the principle of specified perils, where hail is the basic risk, as well as fire and thunderbolt. Supplementary risks include windstorm, spring frost, autumn frost, and flood. Due to climate changes, one insurance company has recently introduced drought as a supplementary risk. There is no comprehensive crop insurance in Serbia, and there is no indication that new crop insurance products such as index-based insurance products and crop-revenue insurance products shall be launched soon. The concept of agricultural risk management, which also includes insurance, has been underrepresented in Serbia. Still, its implementation has been gradually fostered by land consolidation and emerging of big farmers, which started after the privatization process had been launched about fifteen years ago.

On conclusion of an insurance contract, most often a percentage-of-loss deductible is applied. With every crop, except field crops, it is started with 5% deductible, only to be increased up to as much as 50%, which depends on the contract. Naturally, with an increase of deductible, the insurance premium is proportionally reduced. The Serbian agricultural producers are not keen on accepting deductibles, because, in case of a loss, they expect to be paid the full amount of indemnity. On the other hand, the insurers insist on arranging at least a 10-20% deductible with fruits, as the losses are by far the highest considering the insured area.

The state began to subsidize insurance premium in 2007 and that only for the registered farms where agriculture production has been the only source of income. In the first two years, the subsidies accounted for 30% of the premium, only to be increased to 40% from 2009 on. The subsidies in other European countries, with whom we made comparisons, were pretty much the same (although subsidies were not introduced in half of these states). Municipalities, too, may grant additional subsidies, in line with their abilities, which is a practice that can also be seen in other countries having at least comparable agricultural development. It has been estimated that there are 450 000 registered farms, but only a small percentage of them buys insurance against risks that jeopardize crop production. However, Serbia does not have any list of the registered farms, although computerization is not on a very low level.

Based on the data in Table 1, we may conclude that the offer of the Serbian insurance companies is very much similar to that of the insurers in other countries. In addition to hail, as a main risk, there are also several other additional risks that are covered. Not one of the stated countries provides comprehensive crop insurance; in most cases, the state provides subsidies. In all countries listed in Table 1, private companies offer crop insurance, whereas in Serbia, besides private sector, crop insurance is also offered by a leading insurance company, which is in public ownership.

Insured area

In Figure 1, which shows the insured areas in Serbia, one can also observe a gradual increase of insurance coverage

Table 1
The method of writing crop insurance, and government support in Serbia and certain European countries

	Single-risk insurance	Combined insurance	Comprehensive insurance	Crop-revenue insurance	Index-based insurance
Bulgaria	P	P	-	-	-
Czech Republic	PS	PS	-	-	-
Hungary	P	P	-	-	-
Romania	P	P	-	-	P
Slovakia	PS	PS	-	-	-
Slovenia	PS	P	-	-	-
Serbia	PS+GS	PS+GS	-	-	-
Ukraine	P	P	PS	-	PS

-: Not existing; P: Private non-subsidised; PS: Private partially subsidised; GS: Public partially subsidised

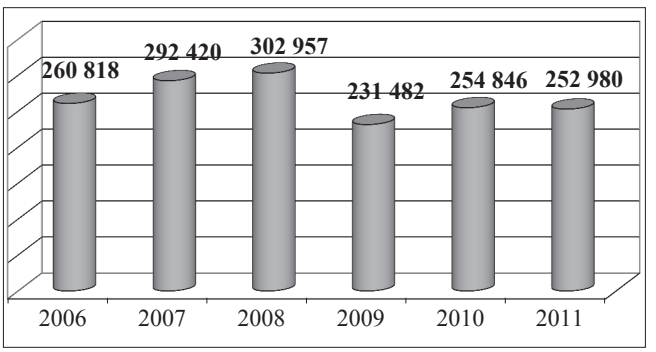

Fig. 1. Total insured acreage in Serbian crop insurance (ha)

from 2006 through 2008, which was the year that saw the largest insured acreage covered. In the last two years that were analyzed, the insured acreage reached and remained at 250.000 ha, i.e. nearly only 7% of the total arable land.

Based on Table 2, where we made comparisons with other countries, we can conclude that there is far less insured arable land in Serbia (even nine times less) than in other countries. Nevertheless, the above indicator is absolute, and may be used only to limited purposes. Still, there is a more important indicator of insurance coverage of the total arable land, which we are about to explore in more detail.

Table 3 shows the percentage of the insured land in comparison to the total agricultural and total arable land in Serbia.

The degree of coverage of agricultural land by insurance is extremely low in Serbia, and ranges from 4.5% to 6.0%. The level of agricultural development is poor, and the same manner of doing business is prevailing. The agricultural producers are not interested in arranging insurance protection of their production much. It is peculiar that the areas, which are insured on a regular basis, have not increased in the past years, they are just distributed differently among the insurers.

Table 2
The average insured acreage in Serbia and certain European countries (‘000 ha)

Bulgaria	1 276
Czech Republic	1 074
Hungary	620
Romania	812
Slovenia	n.d.
Serbia	266
Ukraine	2 400

n.d.: no data

Table 3
Share of insured acreage in the total agricultural and arable land in Serbia

Year	Share of insured acreage in total agricultural land, %	Share of insured acreage in total arable land, %
2006	5.10	7.09
2007	5.72	7.95
2008	5.93	8.23
2009	4.53	6.29
2010	4.99	6.93
2011	4.95	6.88

The percentage of insurance coverage of arable land of as little as 6-8% shows the potential of this line of insurance. However, the insured areas under crops and fruits could be expected to increase only if the state will offer incentives, credits and subsidies, which would ensure development of this line. The agricultural producers would be more interested in insurance of crop production only to protect the funds invested in the production.

In comparison to other countries, Serbia has the least arable land covered by insurance (Table 4). In Hungary and Czech Re-

public, this indicator is higher, thus more favorable, as much as six times, whereas in Bulgaria it is even seven times higher.

Sum insured

Sum insured represents an amount to which a crop is insured. It is determined by the insured himself, and represents the basis for calculation of the premium. The sum insured is normally equal to the value of the insured crop, and is obtained when the expected yield in kilogram per hectare is multiplied with the real, market price. The sum insured is expressed per unit of acreage, and represents the maximum liability of the insurer.

The total sum insured shall be subject to:

- the total insured acreage;
- structure of the insured crops;
- yields to which the crops are insured;
- price of agricultural products.

Alongside with the increase of the acreage covered by insurance, the value of the insured crops has also increased (Figure 2). In the period 2006-11, the sum insured for the insured areas saw an upward trend most of the time. The total value of crop production (sum insured) was the result of not just insurance coverage and/or insured acreage, but also the prices of agricultural products, which are market-dictated. This can be concluded based on the comparative analysis of the data on the insured acreage and sum insured, particularly in 2008 and 2011. The year 2008 saw an increase of the sum insured and insured acreage by over 74% and only 4% respectively, year over year. As for 2011, the sum insured increased by nearly 33%, while the insured acreage decreased by 1% year over year. Such disproportion between the insured acreage and sum insured is a direct consequence of the sharp rise in prices of agricultural products in the past years, whereas the structure of the crops on the insured land did not suffer any significant changes.

Based on the data on the insured acreage and sum insured, namely, the value of the insured crop production, we have calculated the average value of the insured crops and fruits per hectare, and present it in Figure 3.

Table 4
Average insurance coverage of the total arable land in Serbia and certain European countries (%)

Bulgaria	50
Czech Republic	40
Hungary	45
Romania	12
Slovenia	20
Serbia	7
Ukraine	10

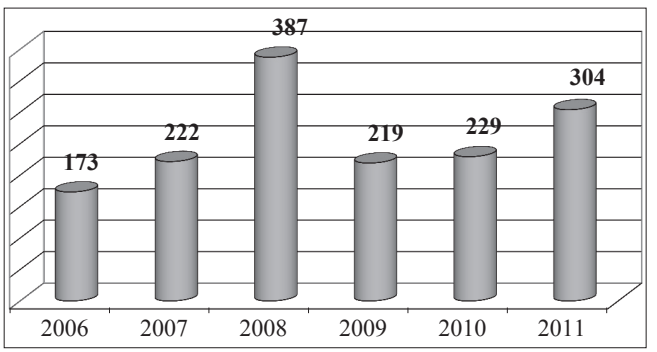

Fig. 2. Total sum insured in Serbian crop insurance (mil €)

Insurance premium

Insurance is a type of business where an insurer undertakes to indemnify an insured a loss in case of occurrence of an insured event for a certain amount (i.e. collected insurance premium). Insurance premium represent a price for the service the insurer provides to the insured. The amount of the premium is directly commensurate with a size of a risk, value of the insured sum, and insurance period. The total premium generated in crop insurance in Serbia in the period under review has the same trend as the sum insured (Figure 4).

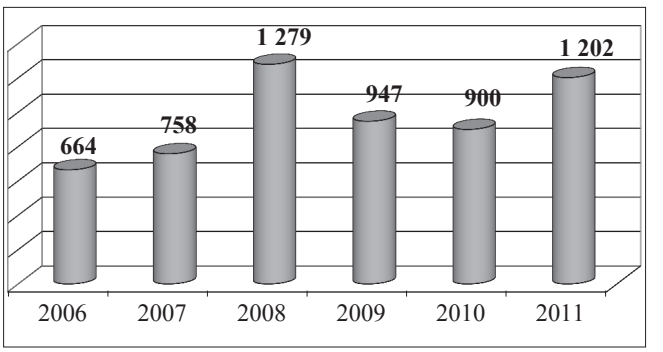

Fig. 3. Average value of the insured crops and fruits in Serbia (sum insured in €/ha)

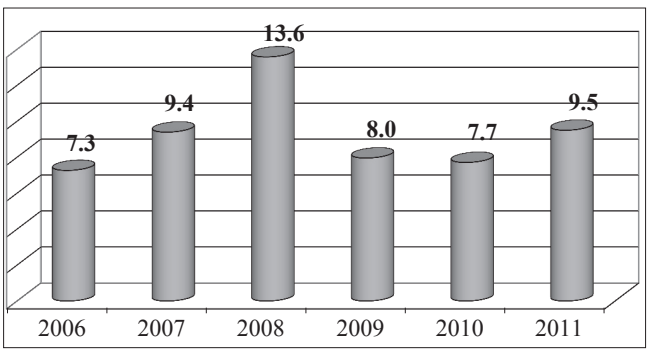

Fig. 4. Total insurance premium in Serbia (mil €)

A sharp growth of insurance premium 2007-08 was the result of the series of factors such as high grain prices, the introduction of government premium subsidies, and a new rating tariff developed by the leading agricultural insurance company. After that, the premium volume recorded a downfall, partly due to a decrease in grain prices and partly to the economy crisis in agriculture, which caused bankruptcies and missed premium payments (AXCO, 2011).

As far as comparison with other countries is concerned, Table 5 shows that only in Bulgaria the crop insurance premium is lower than in Serbia. The premium in Czech Republic and Hungary is up to four-five times higher than in our country.

We have also explored the share of crop insurance premium in the total premium for all lines of non-life insurance (Table 6). When compared to the total written non-life premium, we can see that the share of crop insurance is almost negligible, and is approximately 2% at its best.

The amounts in Figure 5 show us that, in the period under review, the trend of the average written premium per hectare is similar to that of the majority of other indicators.

Claims

In the observed period, the fewest damages to the insured crops and fruits were incurred in 2009, while the years of 2007 and 2010 saw the highest volume of damages (Figure 6).

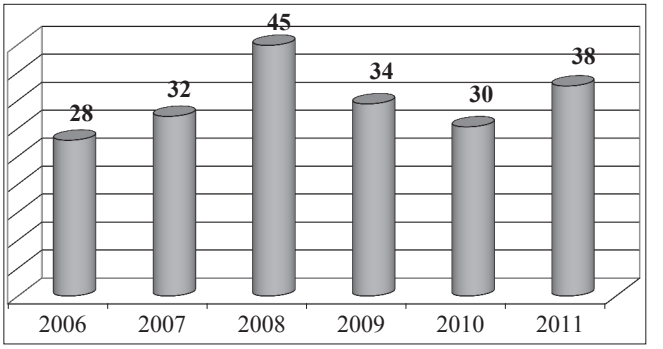

Fig. 5. Average insurance premium in Serbia by insured acreage (€/ha)

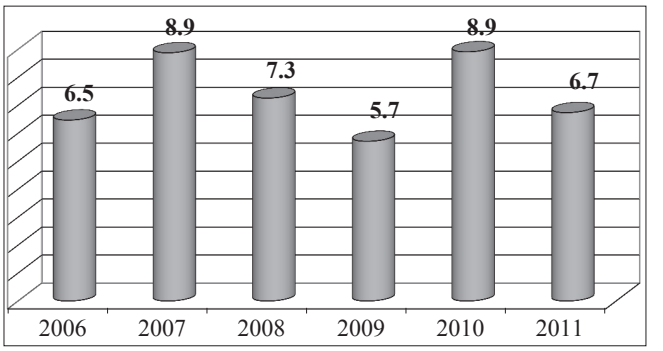

Fig. 6. Total claims in Serbian crop insurance (mil €)

Table 5
Average annual crop insurance premium in Serbia and certain European countries (mil €)

Bulgaria	7
Czech Republic	32
Hungary	44
Romania	14
Slovenia	10
Serbia	9
Ukraine	23

Table 7
Average loss ratio in crop insurance in Serbia and certain European countries (%)

Bulgaria	74
Czech Republic	52
Hungary	80
Romania	25
Slovenia	50
Serbia	118
Ukraine	40

Table 6
Significance of crop insurance premium in the total non-life premium in Serbia

Year	Total non-life premium, mil €	Crop insurance premium, mil €	Share of crop insurance premium in total non-life premium, %
2006	4552	73	1.60
2007	5598	94	1.68
2008	6411	136	2.12
2009	5701	80	1.39
2010	5487	77	1.40
2011	4639	95	2.05

Hail has been the predominant cause of damages, although it was mostly of the local character. Still, there were exceptions to this rule, too. One of the examples was the hailstorm that hit the municipality of Arilje, in the middle Serbia, which is the region with the highest production of raspberries. The hailstorm hit in the worst possible moment – a few days before fruit picking, when damage is certain to be the worst.

In 2008, there were the least damaged areas, and the most in 2007 (Figure 7). The reason behind the discrepancy between the damaged areas and the amount of claims should be sought in the structure of the damaged areas. The structure of the damage crops is important, because the value of the crops is varied. For example, field crops have a notably lesser value than orchards. Hence, if most of the damage crops were field crops, the amount of claims would be less than if the damages were caused to larger areas under orchards.

Figure 8 presents the data on the average amount of crop claims in Serbia.

The extent to which the amount of incurred damages will follow the increase and/or decrease of insurance coverage of crops and fruits depends primarily on the structure of the insured land, namely on the percentage of share of the various types of the insured crops. Among other reasons that influence the amount of claims are the insurers' business policy (selection of the insures and implementation of deductibles), insurance coverage (risk dispersion), and sum insured (yields and prices to which the crops are insured).

Loss ratio

The established loss ratio, namely the ratio of claims and premiums, is important for both the insurer and the insured. The insurer may not do business in the end with a negative loss ratio, as it would mean that the amount payable for claims is higher than the amount generated from insurance premium. It is also important for the insured to monitor the loss ratio, so that he may be able to choose the appropriate insurance coverage on conclusion of an insurance contract.

Furthermore, the loss ratio is an indicator of whether the premium rates for the underwritten risks are appropriate. The period under review (Figure 9), shows that a positive loss ratio was realized only in 2008, that this insurance barely had any positive results in 2009 and 2011, and that it had negative results in other years, particularly in 2010.

The findings presented in Table 7 point to a fact that Serbia is the only country among the observed countries having an unfavorable loss ratio in crop insurance on average. Therefore, the Serbian insurers must generate profit in other lines of business – in particular, from the point of view of agriculture, the favorable effects of motor insurance, insurance of buildings, equipment, and persons employed in agricultural industry, are redirected to cover the unfavorable loss ratio in crop insurance.

Discussion

Insurance protection of crop production in Serbia has been extremely underdeveloped. It can be seen not only in the types of the implemented insurance protection, but also in the scope of insurance coverage of the arable land. Obviously, the awareness of agricultural producers and farmers about the need for insurance has not been sufficiently devel-

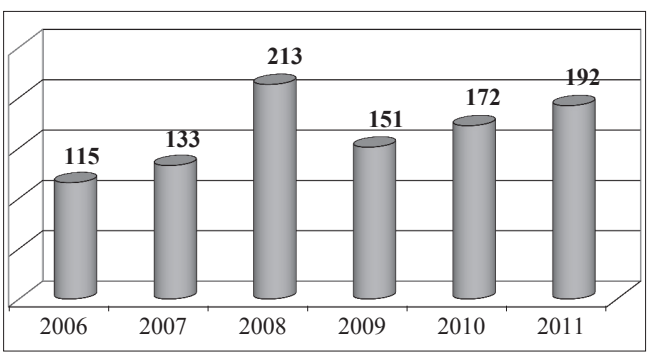

Fig. 8. Average amount of claims in crop insurance in Serbia (€/ha)

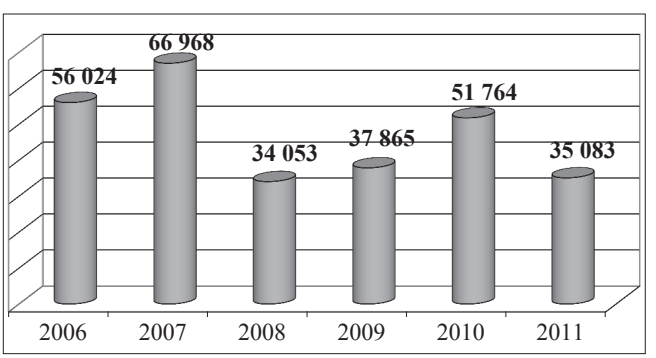

Fig. 7. Total damaged acreage in Serbia (ha)

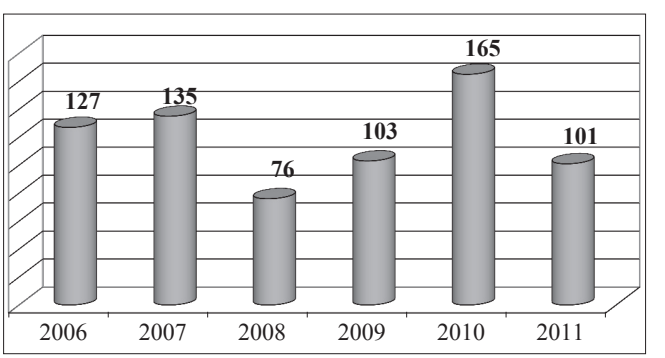

Fig. 9. Loss ratio in Serbian crop insurance (%)

oped. Professional farmers and agricultural companies mostly arrange insurance of crops in our conditions. Unfortunately, the majority of small agricultural producers, who have less property, simply avoid arranging insurance, even though their revenues depend on the whims of nature. It is necessary for the insurance in Serbia to take the same position it has in modern, more developed market economies. This development can be encouraged not only by the state and/or credit institutions supporting the development of agriculture, but also by the insurers, as well as the farmers themselves.

Another issue is a voluntary and/or compulsory element of crop production. We have already emphasized that this line of insurance is arranged on voluntary basis in most of the countries. In Serbia, one could occasionally hear about passing a relevant law which would introduce compulsory crop insurance (Xprimm, 2011a; Xprimm, 2011b). In our opinion, it would not be a good move, since the relations in this line of insurance could not be based on coercion, but on economy interest of all interested parties. The farmers are likely to view compulsory insurance of crop production yet another toll in the already impoverished agriculture.

Only insurance companies having a big capital, good reinsurance protection, numerous and professional experts, and assessment of claims based on scientific and professional knowledge can engage in crop insurance in the best possible manner. Since crop insurance is a seasonal activity, many farmers insure their crops in the period of spring farm work. Due to the volume of work, insurers often conclude insurance contracts without inspecting the subject of insurance, and thus make a big mistake. Their obligation is to determine the condition of the crops on the spot – first, to check if the crops exist, and then to assess whether the yield that is to be insured is expected and realistic for that region. The amount of premium rates within the same classes of risks differs significantly with the insurance companies. In order to ensure their position in the market, insurance companies offer various discounts that are completely unjustified. In this unfair competition among the companies, the insures having a negative loss ratio profit the most, while the insurance companies do not manage to balance the amount of written premium with the paid claims.

The fact is that many farmers in our country choose not to insure crop production, because the agricultural taxes are high as it is which is why insurance is the last thing on their minds. For farmers, who barely manage to ensure the money needed to invest in production (seed, fertilizers, pesticides), crop insurance represents an unnecessary expense. The result of this situation, which has been a severe strain on our agriculture for some time now, is reflected in extremely low yields compared to the countries with developed agriculture. With such low yields, there is no interest in arranging insurance protection, unless insurance quotes are symbolic, so the insurance companies are forced to decrease the premiums by offering various types of discounts in order to attract the producers to have their crops insured. However, by conducting business in this manner, the insurers put themselves in a position where they cannot ensure a large enough fund to cover losses from the written premium, which is why their operations in this line of business are often 'in the red', as we have already pointed out.

For some years now, the government has been trying to provide incentives for crop insurance by subsidizing the premium, i.e. return a portion of the premium to the insured, and thus improve the situation in this area. Although there is no doubt that, such a measure gives good results, and is supported by both the insures and insurers, the progress is still symbolic – in 2011 only 11,548 policies were written.

The farmers have always expected that the government shall account for any damages to the crops by declaring a natural disaster. The government, on the other hand, endeavors to shift the burden of responsibility for catastrophic consequences of natural disasters to insurance companies. By raising the insurance awareness of the population, the government will shut itself out and thus pass the burden of the decision on purchasing insurance policies to the agricultural producers themselves. At present, the government does behave in the above way, but by doing so, puts the producers in a discriminated position. The producers, for whom crop production is not the sole source of income, are not motivated to insure their crops, because the 40% of the premium, for which they are not subsidized, makes them uncompetitive, and increases their production costs.

Unawareness and indifference of agricultural producers in Serbia also stand in the way of a more serious growth of insurance protection. The farmers are not familiar with all the potentials that the crop insurance has to offer, so they often consider insurance an unnecessary expense. The effect of insurance is obvious only in the years that brought damages to crops. Only then, it is considered justified, and only then does the interest of agricultural producers in this type of crop protection increase. In the years when there are no damages to crops or they are only symbolic, the interest in insurance in the following period is poor. Therefore, the insurers must work harder on getting the agricultural producers familiar with the advantages offered by crop insurance. In Serbia, only a small percentage of arable land is insured and that mostly in areas susceptible to hailstorms, where damages occur almost every year. Since mostly farmers, who often suffer damages and with whom the risk is almost certain, opt for insurance, it is no wonder that the results in this line of business are mostly negative.

Drought is a phenomenon that affects wide areas, usually the entire state. It may lead to a serious drop in agricultural

yields, and thereby significantly affect entire food production. At present, only one insurance company in Serbia provides insurance against drought, but, unfortunately, it is distinguished by a disputable procedure of claims assessment. The level of drought is established based on meteorological indicators, but is also confirmed by a claim assessor, since the actual yield must be decreased, when compared to the insured yield. Decrease of yield due to drought is difficult to prove, since it may arise not only from the lack of precipitation, but also from failure to apply the prescribed production technology. A claim assessor may always use the above argument to refuse a claim. It would be much more objective, if the decisions were made only based on the meteorological data.

The role of prevention is to reduce the probability of occurrence of risks, namely, to prevent occurrence of loss events on insured crops and fruits. The nature of preventive actions depends primarily on the risks that threaten crop production. They should aim at causes of damages caused by the predominant risks. Since hail is the cause of most of the damages, the most efficient protection is anti-hail protection net, setting up of which has proven to be too expensive for many producers. Antifreeze systems and/or foils are also of great use. By using these, along with protection against frost, fruits may be picked even when it rains, and the plantations are protected from hail. The preventive measures should be included in the agricultural risk management in Serbia much more than they are now.

If we also take into consideration the indicators from the selected European countries, which we analyzed in this paper, it is obvious that crop insurance in Serbia has been one of the most underdeveloped in Europe. However, it has a great potential for development. We would particularly emphasize negligible insurance coverage of the total arable land, which makes it impossible to apply the calculation of probability and law of large numbers, being the fundamental guidelines of insurance protection.

Conclusion

In our opinion, the insurance companies in Serbia need to be more present in the field. Their marketing activities should be increased, both those carried out before a season (in winter) and in mid-season (March-July). The insurers should cooperate at all times to monitor the conditions on the market, and undertake joint actions with the aim of creating a healthy competition. The farmers should be familiarized with the crop insurance terms and the risks covered by insurance. It is particularly important to emphasize the obligations of the contractual parties during the insurance period.

From the point of view of the insured, it is crucial for him to know when the insurer should assess a loss and pay insurance indemnity. When a loss occurs, their just and objective assessment is essential. The insurers operating in the same region should have commonly accepted rules on the manner of loss assessment, which must be observed by all in order to have a standardized amount of paid claims. In case of total losses, the total amount of claims should obligatorily be decreased by the costs of unfinished agricultural work on all crops and fruits.

In Serbia, the insured agricultural areas are pretty small, and they are mostly concentrated in regions susceptible to hail. Only after the crop insurance is developed enough to include other regions of the country, there will be a higher dispersion of risks, which would have a positive impact on the actual loss ratio of the insurers. Along with the obligatory control of the crops before a contract is concluded, insurance companies should also insure the crop to a realistic yield and at market prices. The insurer must not insure the crops to an unrealistically high yield, since, in case of a loss, indemnity shall be paid only up to the amount of the actual yield, so the insured would pay an unreasonably high premium. On the contrary, if the insured yield were small, the insurer would lose a portion of the premium that he may generate. The producers themselves should also take some part of the risks. By applying a deductible effectively, the insured would reduce the price of insurance by a share that he would have to bear in case of a loss. We argue in favor of applying deductibles as much as possible, especially in case of fruits, where the sums insured and risks are high.

Serbian farmers are economically weak and try to cut down production costs and thus remain competitive on the market. Since insurance is only part of the costs that they want to eliminate, the amount of premium should be adjusted to suit the economic position of the producers. This is certainly positively influenced by the government through subsidizing. We are of the opinion, however, that premium subsidies should not be granted just to the registered households, for whose members the agriculture is the sole source of income. Every food producer, whether it is his core or additional business, whether he is a legal entity or a natural person, should receive this type of government assistance the same way. Simultaneously, the state should stop providing direct help to farmers after devastating natural disasters, whereby it would clearly let them know that they should arrange insurance protection.

Furthermore, it is up to the insurance companies to offer new products, whose coverage would be more comprehensive and more acceptable to producers. These products should take into account the fact that the climate changes in Serbia, too, have an increasingly aggravating effect on crop production, because there is a growing risk of drought, storms, and flood. Collection of premium should be even more conformed to the payment ability of the farmers, which means that the insurers

should persist on payment of premium by installments, and payment after harvesting or picking.

References

AIO, 2012. Agricultural Insurance Organization, http://www.cyprus.com/agricultural-insurance-organization.html.

AXCO, 2011. Insurance market report Serbia: non-life. London, pp. 146.

Babcock, B. A., 2010. The political economy of the US crop insurance program. In: E. Ball et al. (Editors), The economic impact of public support to agriculture: an international perspective, *Springer*, New York, pp. 293-308.

Babcock, B. A., D. J. Hayes and C. Hart, 2004. Actuarial fairness of crop insurance rates with constant rate relativities. *American Journal of Agricultural Economics*, **86:** 563-575.

Bennett, C., 2004. Dictionary of insurance, second edition. *Pearson Education Limited*, Harlow, 352 pp.

Burgaz, F. J., 2009. The Spanish combined agricultural insurance system, http://aplicaciones.magrama.es/documentos_pwe/confe/burgaz-ing.pdf.

Carter, C. and A. Smith, 2007. Estimating the market effect of a food scare: The case of genetically modified starlink corn. *The Review of Economics and Statistics*, **89:** 522-533.

Chambers, R. G. and J. Quiggin, 2004. Technological and financial approaches to risk management in agriculture: an integrated approach. *Australian Journal of Agricultural and Resource Economics*, **48:** 199-223.

Costello, R. M., 2012. Crop insurance: Iowa license exam manual. *CreateSpace*, Seattle, WA, 56 pp.

Diaz-Caneja, M. B., C. G. Conte, F. J. Gallego Pinilla, J. Stroblmair, R. Catenaro and C. Dittmann, 2009. Risk management and agricultural insurance schemes in Europe. *JRC Reference Reports, European Commission, The Institute for the Protection of the Citizen,* Ispra, VA, Italy, 28 pp.

Duncan, J. and R. J. Myers, 2000. Crop insurance under catastrophic risk. *American Journal of Agricultural Economics*, **82:** 842-855.

Enjolras, G. and P. Sentis, 2011. Crop insurance policies and purchases in France. *Agricultural Economics*, **42:** 475-486.

Finger, R. and N. Lehmann, 2012. The influence of direct payments of farmers' hail insurance decisions. *Agricultural Economics*, **43:** 343-354.

Goodwin, B. K. and V. H. Smith, 1995. The economics of crop insurance and disaster aid. *AEI Press*, Washington, DC, 153 pp.

Graham, L. and X. Xie, 2007. The United States insurance market: characteristics and trends. In: J. D. Cummins and B. Venard (Editors), Handbook of international insurance, *Springer*, New York, pp. 25-145.

Gulcubuk, B. and E. Gunes, 2010. Applicable agricultural insurance models at the rural area: A case study from Turkey. *Scientific Research and Essays*, **9:** 837-844.

Hatch, D. C., 2009. Agricultural insurance: a focus on the southern cone – observations and critical success factors, http://www.iica.int/Eng/regiones/norte/USA/Documents/Agricultural%20Insurance%20-%20A%20Focus%20on%20the%20Southern%20Cone%20-%20Observations%20and%20Critical%20Success%20Factors.pdf.

Jong, P. de and G. Z. Heller, 2008. Generalized linear models for insurance data. *Cambridge University Press*, Cambridge, 206 pp.

Knight, T. O., K. H. Coble, B. K. Goodwin, R. M. Rejesus and S. Seo, 2010. Developing variable unit-structure premium rate differentials in crop insurance. *American Journal of Agricultural Economics*, **92:** 141-151.

Lotze-Campen, H., 2011. Climate change, population growth, and crop production: an overview. In: S. S. Yadav et al. (Editors), *Crop adaptation to climate change, Wiley*, Hoboken, NJ, pp. 1-11.

Mahul, O. and C. J. Stutley, 2010. Government support to agricultural insurance: challenges and options for developing countries. *World Bank Publications*, Washington, DC, 244 pp.

Morgan, W., J. Cotter and K. Dowd, 2012. Extreme measures of agricultural financial risk. *Journal of Agricultural Economics*, **63:** 65-82.

NBS, 2012a. Insurance companies operations, http://www.nbs.rs/internet/english/60/60_2/index.html.

NBS, 2012b. Insurance sector in Serbia, Report for 2011, http://www.nbs.rs/export/sites/default/internet/english/60/60_6/insurance_IV_2011.pdf.

Porter, P., L. Scott and S. Simmons, 2009. Northern Midwest (U.S.): Farmers' views of the conversion process. In: S. R. Gliessman and M. Rosemeyer (Editors), *The conversion to sustainable agriculture: principles, processes, and practices, Taylor & Francis Inc CRC Press Inc*, Bosa Roca, US, pp. 67-90.

Ray, P. K., 1999. A practical guide to multi-risk crop insurance for developing countries. *Taylor & Francis Inc Science Publishers, U.S.*, Enfield, 174 pp.

Rejesus, R. M., K. H. Coble, T. O. Knight and Y. Jin, 2006. Developing experience-based premium rate discounts in crop insurance. *American Journal of Agricultural Economics*, **88:** 409-419.

Rejesus, R. M., B. K. Goodwin, K. H. Coble and T. O. Knight, 2010. Evaluation of the reference yield calculation method in crop insurance. *Agricultural Finance Review*, **70:** 427-445.

Roberts, R. A. J., 2005. Insurance of crops in developing countries. *Food and Agriculture Organization of the United Nations*, Rome, 78 pp.

Sherrick, B. J., P. J. Barry, P. N. Ellinger and G. D. Schnitkey, 2004. Factors infuencing farmers' crop insurance decisions. *American Journal of Agricultural Economics*, **86:** 103-114.

Shields, D. A., 2011. Federal crop insurance: background and issues. In: A. M. Gil (Editor), *Agriculture Disaster & Crop Insurance, Nova Science Publishers*, Hauppauge, NY, pp. 43-62.

SIFB, 2012. Sugar Insurance Fund Board, http://www.sifb.biz/.

Sivakumar, M. V. K. and R. P. Motha, 2010. Managing weather and climate risks in agriculture. *Springer-Verlag Berlin and Heidelberg*, Berlin, 536 pp.

SORS, 2011. Statistical yearbook of the Republic of Serbia. *Statistical Office of the Republic of Serbia*, Belgrade, 408 pp.

Swiss, Re, 2007. Insurance in emerging markets: sound development; greenfield for agricultural insurance. *Sigma*, **1**: 1-42.

Swiss, Re, 2011a. Product innovation in non-life insurance markets. *Sigma*, **4**: 1-36.

Swiss Re, 2011b. Insurance in emerging markets: growth drivers and profitability. *Sigma*, **5**: 1-35.

Vavrova, E., 2005. The Czech agricultural insurance market and a prediction of its development in the context of the European Union. *Agricultural Economics/ Zemedelska ekonomika*, **11:** 531-538.

Vercammen, J. and D. J. Pannell, 2000. The economics of crop hail insurance. *Canadian Journal of Agricultural Economics*, **48:** 87-98.

Wright, B. D. and J. A. Hewitt, 1994. All-risk crop insurance: lessons from theory and experience. In: D. L. Hueth and W. H. Furtan (Editors), *Economics of agricultural crop insurance: theory and evidence, Springer,* New York, pp. 73-114.

Xprimm, 2011a. Serbia: mandatory insurance in agriculture, http://www.xprimm.com/SERBIA-Mandatory-insurance-in-agriculture-articol-2-,10,26-855.htm.

Xprimm, 2011b. Point of view, http://www.xprimm.com/Vladan-MANIC-Secretary-General-of-the-Association-of-Serbian-Insurers-articol-120,122-1313.htm.

Received March, 23, 2013; accepted for printing December, 2, 2013.