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The role of insurance in the damager mitigation of fruit orchards

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Summary: Hungary faced many natural disasters in 2007. Due to the estimation of the Hungarian Chamber of Agriculture, the amount of natural disasters that occurred in Spring 2007 (frost, hailstorm and drought in April and May) is about 100 billion HUF. Frost and drought caused damage on about 250 thousand hectares of arable land. Currently, there are four insurance companies dealing with agricultural insurances in Hungary. Their income was nearly 20 billion HUF in 2003, whereas it barely exceeded 6.6 billion HUF in 2004. The reason behind the significant decrease of insurance fee is the state provision made in 2004 stopping fee subsidisation which originally started in 1996, enabling farmers to require a 25–30% reimbursement of the amount paid for insurance. Launching a state subsidisation again would greatly increase the number of agricultural insurances. The law about the national agricultural mitigation system passed last Autumn. This provision declares that the mitigation of agricultural damage that cannot be insured on a business-like basis is based on the common risk-taking by the state and the farmers. The introduction of this system is explained by the fact that the mitigation of damages through disaster can only be carried out if those affected also take part in it, according to EU rules.

Key words: insurance, fruit, extreme weather risk factors

Introduction

Agricultural production is a rather risky activity, as it is largely exposed to accidental effects. In order to be able to avoid and reduce the losses occurring due to these effects, farmers consider it important to quantify the expected risk and to establish the decisions concerning the development of risk protection systems before they start any activity. In agricultural production, risk is also in connection with the unfavourable changes of economic factors affecting the farmers, besides the physical effects of environmental factors, such as unfavourable weather and environmental conditions, the occurrence of pathogens and pests. Risk assessment and risk management are expected to have a bigger role in agriculture in the future (*Hardaker* et al., 2004).

Hungarian fruit production has the following extreme weather risk factors:

- winter frost
- autumn frost
- hailstorm
- shortage of precipitation during the growing season
- too high temperature during the dormancy period
- rainstorms, windstorms
- autumn frost

Natural risk emerges in the form of damages through disaster

The types and distribution of agricultural damages are shown in Table 1, based on the assessment of insurance companies, the chamber of agriculture and the ministry. This assessment covers 38 years, ending in 2006. Depending on the crop year, the amount of damage and loss was about 3–10% of the production value of crop production and horticulture.

Table 1: Damages in crop production and horticulture

Type of damage	Distribution %
Frost damage	14,9
Drought damage	39,1
Hail damage	22,3
Inland waters	21,1
Other damage though disaster	2,6
Total	100,0

Source: Surveys by the Ministry of Agriculture and Rural Development, Association of Hungarian Insurance Companies, data of insurance companies

The occurrence of drought damage is the most significant (39%), primarily in the counties of the Hungarian Great Plain, but it is also dominant in the middle of Transdanubia. The occurrence ratio of hail damage is 22.3%, whereas that of inland waters is 21.1%. Frost damage (14.9%) occurred in the whole country, but it was more typical in Northern

Hungary and Szabolcs-Szatmár-Bereg county, whereas the ratio of occurrence of other damages – rainstorm damage, sandblast – was only 2.6%.

Both Hungarian and foreign observations show that farmers rather prefer technical safety to contracts with insurance companies.

The delaying of florescence was one of the most effective and most economical way of protection against spring frost (*Szabó*, 2004; *Szabó* et al., 2004;).

Spray irrigation during florescence is one of the most effective methods against cold temperature during this period. The usage of paraffin heaters can also be an option at places where temperature does not drop below the critical value every year or where it drops below it for only one or two nights. Anti-hail nets have significant importance in the protection against hailstorms, but atmospheric hail suppression systems are also successfully used. Nevertheless, before significant investments are carried out – in Spain, the approximate investment cost of anti-hail nets is 9,000–12,000 EUR/ha –, the conditions of the plantation, the market position of the given fruit and the economicalness of the investment and damage protection have to be thoroughly examined (*Csete & Nyéki*, 2006).

Figure 1 shows the data series of Hungary's hail damage proportions covering 110 years.

When we analyse the elements of this long time series, we can distinguish four different periods. Besides natural damages and accidental effects, these cycles also represent social changes in our opinion.

The four periods cover the following courses: 1st period: 1897–1940; 2nd period: 1941–1966; 3rd period: 1967–1990; 4th period: 1991–2006.

The year 2007 had an especially severe impact on agriculture. Besides the major drought damage, hail and frost damage was also rather significant. Table 2 shows the size of fruit production areas in Hajdú-Bihar county damaged by hail and frost damage.

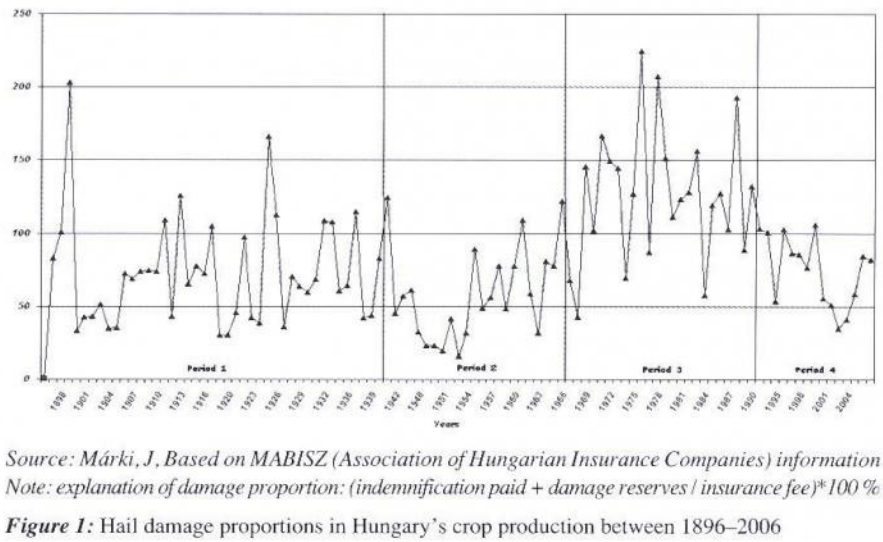
Frost can cause rather significant damages in fruit plantations all over Hungary. On 22–23rd April and 2–3rd May 2007, nearly the whole fruit production area of Hungary was damaged by frost to an extent never seen during the last sixty years.

Table 2: Areas affected by damages through disaster in Hajdú-Bihar county in 2007 (hectares)

Fruits	Hail damage	Frost damage
apricot and peach		39,78
nectarine		14,47
apple		1030,9
pear		12,9
plum		163,1
sour cherry		525,9
cherry		31,1
raspberry	1,4	1,2
currant		18,64
nut		46,87
bramble		6,55
gooseberry		20,89
strawberry		3,49
elder		0,77
quince		0,01
Fruits total	**1,4**	**1916,57**

Source: www.haon.hu

As it is shown in *Figures 2, 3* and *4*, the extent of damages often reached 100%. It was 80–100% in the northeastern part of Hungary and around Csorna, Kisbér, Rétság, Heves and Füzesabony, whereas it amounted to 50-80% in the central part of the country and in significant part of the northern regions. The southwestern and southeastern parts of Hungary were not affected by frost, the extent of frost damage was only 5–10%. The most severe frost damages afflicted Northeastern Hungary, more specifically three counties, Borsod-Abaúj-Zemplén, Szabolcs-Szatmár-Bereg and Hajdú-Bihar county. The other reason why this frost damage is severe is because these three counties represent 70% of the Hungarian apple yield (*Avar*, 2007). In the case of apricot, the North Great Plain region suffered from the most severe frost damage (Legyesbénye and Gönc, Boldogkőváralja: 97,5%). As for apple, it is also the North Great Plain that was afflicted by the biggest frost damage, it reached 100% in Sárospatak. In the case of sour cherry, the North Great Plain and Rétság were the areas that suffered from the biggest frost damage.

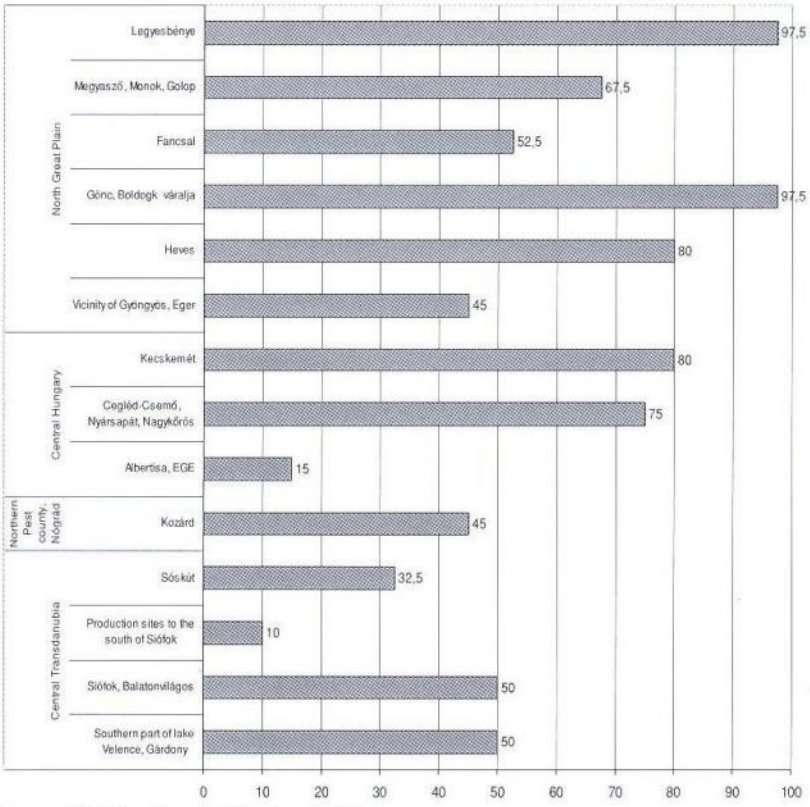


Source: Márki, J. Based on MABISZ (Association of Hungarian Insurance Companies) information
*Note: explanation of damage proportion: (indemnification paid + damage reserves / insurance fee)*100 %*

Figure 1: Hail damage proportions in Hungary's crop production between 1896–2006

The national agricultural mitigation system is one of the solutions for the solutions for the compensation of damages

The law no. LXXXVIII/2006 about the agricultural mitigation system contains the fundamental rules of the mitigation system. Its most important basic principle is volunteership and common burden-sharing, therefore



Source: Zöldség- és gyümölcspiac, 2007

Figure 2: Frost damages of apricot between 23–24th April and 2–4th May 2007 (%)

producers can voluntarily join the fund and the state supplement is equal to the amount paid by producers. The financial tasks of the mitigation system are carried out by the Agricultural and Rural Development Agency (ARDA), which also handles the databases compiled during the operation of the system. Mitigation covers only drought, flood, inland waters and frost. Producers can join the mitigation system on the basis of their mitigation contract with ARDA, in which the parties lay down their responsibilities. Producers supply the data of the land used by them, they declare the method of their land use and they agree to pay a contribution in accordance with the size of their land to the transaction account of ARDA until 30th September of the given year. Producers must make their contract for the whole land they use, it is not possible to include only one part of them, for example the areas most exposed to natural damages. Producers must also declare whether the smallholding led by them is classified as a micro-enterprise, a small business, a medium-size enterprise or other kind of enterprise. Producers not paying their contribution until 30th September are automatically excluded from the mitigation system. Producers are entitled to access an indemnification only if their damage reduces yield value by more than 30%. The calculation of yield value is done by comparing the actual yield of the year of damage to the average yields of the preceding three years and the loss of revenue is then quantified in HUF, using prices set in a separate provision. The amount of indemnification cannot be more than the decrease of yield value. If there is not enough money available in the given year, then all producers who contracted with the system will have access to proportionally less indemnification (*Forró*, 2007a).

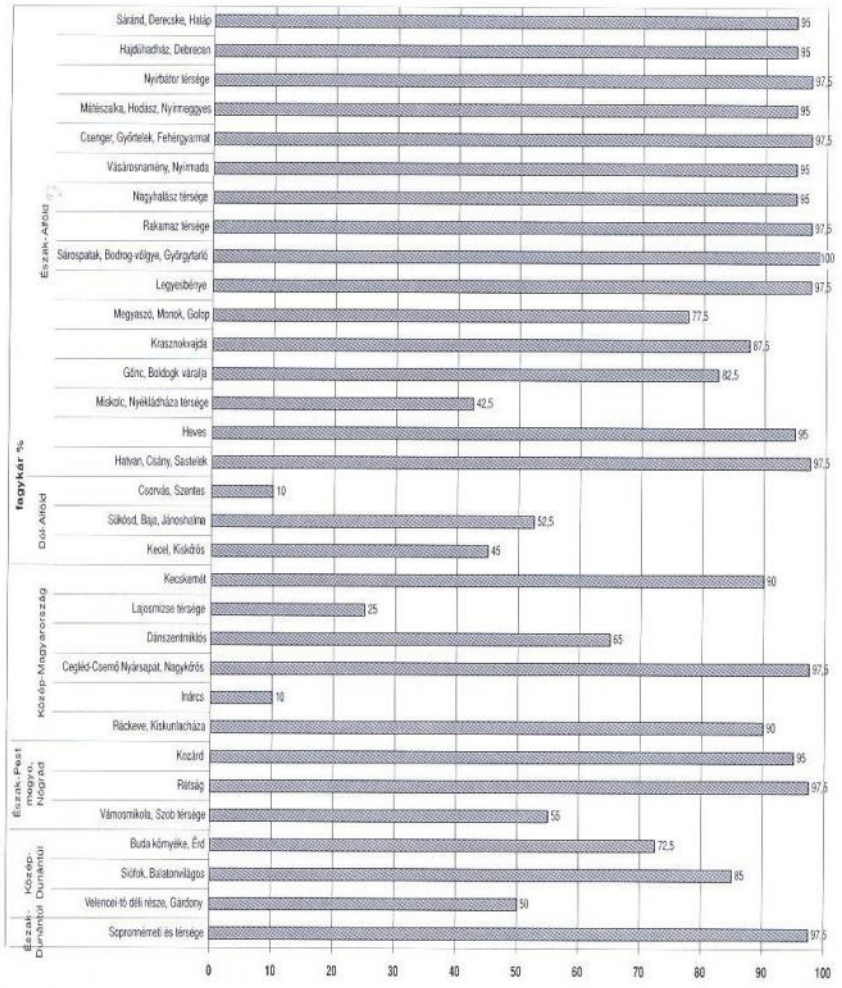
The essence of voluntary insurance fund is that producers pay 1,000 HUF/ha into the fund in the case of plough-land use and they pay 3,000 HUF/ha in the case of plantations – e.g. grape or fruit plantations – that the state supplements by the same amount of money. Producers must report the damage event to the Central Agricultural Office within 10 years following its occurrence (*Forró*, 2007b).

It is a significant point – not contained by the exemption statute – in the change of the regulation of mitigation that producers who had not joined the mitigation system were given an opportunity to make a mitigation contract until 15th July 2007. The statute also contains some reservations declaring that the beneficiary of subsidisation can only be small and medium entrepreneurs (and primary producers) and flood is not considered to be a disaster that entitles producers to request indemnification. It excludes 100% mitigation, the maximum percentage of indemnification is 90% for less favoured areas and 80% for other areas. According to a further aspect, damaged parties can access part of the indemnification before the end of the actual year as advance

Table 3: Data of national mitigation system (2007)

Country	Total insured area (ha)	Fruit (ha)	Plough-land (ha)
Baranya	13293,59	362,50	12845,96
Bács-Kiskun	46746,89	3610,54	38576,62
Békés	44442,69	253,96	44174,33
Borsod-Abaúj-Zemplén	46902,75	3534,44	43107,10
Budapest	5087,13	1047,60	3681,42
Csongrád	48023,76	1255,93	46658,91
Fejér	22450,77	1248,31	21088,81
Győr-Moson-Sopron	8204,53	471,98	7610,08
Hajdú-Bihar	18210,85	1893,28	16309,61
Heves	4897,31	1477,36	2840,29
Jász-Nagykun-Szolnok	51773,55	190,87	51489,08
Komárom-Esztergom	2455,73	286,23	2167,50
Nógrád	8282,73	574,97	7704,79
Pest	42378,42	4376,90	37709,02
Somogy	11430,89	841,00	10537,18
Szabolcs-Szatmár-Bereg	85584,22	23014,86	62533,81
Tolna	11867,67	161,44	11579,71
Vas	4261,08	33,44	4227,14
Veszprém	3659,23	137,87	3498,17
Zala	6746,88	119,23	6624,33
Total	**486700,65**	**44892,73**	**434963,84**

Source: MVH, 2008



Source: Zöldség- és gyümölcspiac, 2007

Figure 3: Frost damages of apple between 23–24th April and 2–4th May 2007 (%)

payment, which can reach even 90% of the allowance to be transferred (*Forró*, 2007c; *Horváth*, 2007).

Due to the statute, producers could indicate their intention to contract in 2008 in writing until 31st December 2007. It is a general rule for those who also carry out complementary activities to get more than 50% of their income from agricultural activity. If the decrease of yield value did not reach 30%, payment of indemnification will not take place either.

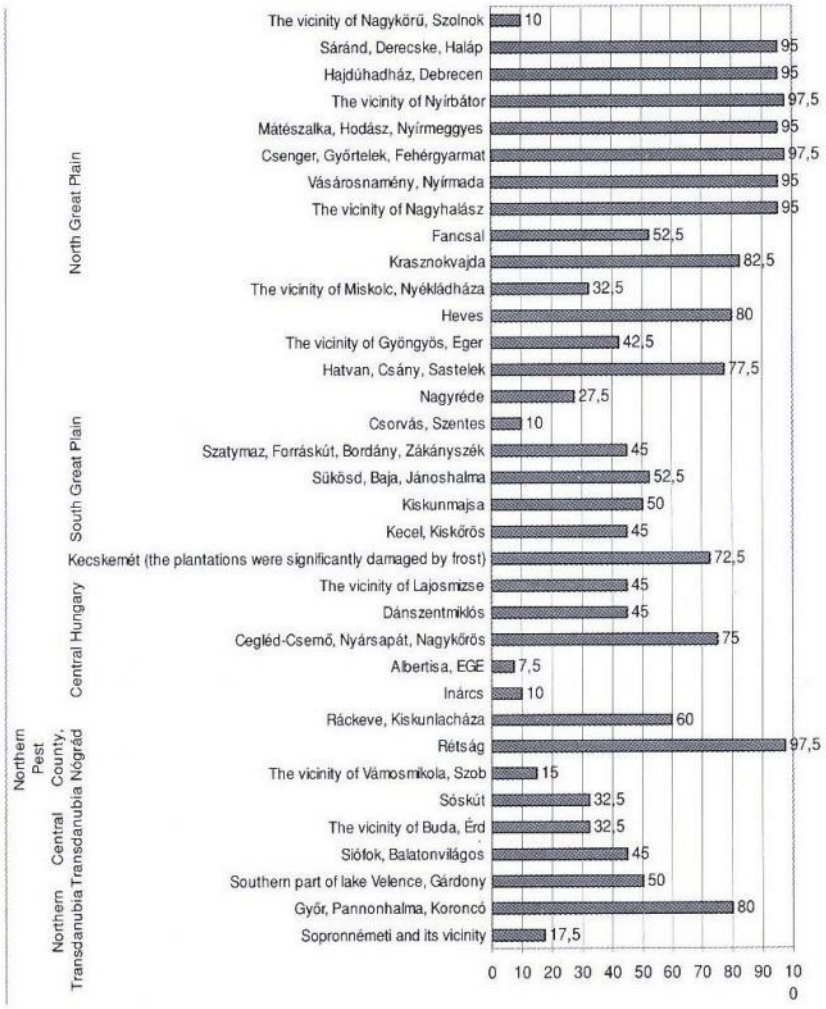
It can be seen in *Table 3* that the total area insured was 486700 hectares, which comprised of 44893 hectares of orchard, 434964 hectares of plough-land and 6844 hectares of grape. Szabolcs-Szatmár-Bereg county had the biggest insured area (85584 hectares), whereas Komárom-Esztergom county had the smallest one (2456 hectares). Whereas the previous county entered the system with 62534 hectares of plough-land, the latter one had 2168 hectares of it. Szabolcs-Szatmár-Bereg county has the biggest (23015 hectares) insured fruit production area, whereas Vas county has the smallest one (33 hectares). Producers in Bács-Kiskun county entered the system with 4560 hectares, whereas this value is only 0.5 ha in Vas county. As for Hajdú-Bihar county, small businesses entered the national mitigation system with 1279 hectares, medium-size enterprises insured 7564 hectares, whereas micro-enterprises (and primary producers) entered the system with 9368 hectares. The respective values for Szabolcs-Szatmár-Bereg county are 8159 hectares (small businesses), 11793 hectares (medium-size enterprises) and 65 633 hectares (micro-enterprises).

Insurance companies can further reduce the risk arising from natural damages

The first insurance companies operating in Hungary were two Austrian ones in the second half of the 19th century and they only focused on a limited insurance range. The first significant turning point was the establishment of the First Hungarian General Insurance Company in 1857. The Farmers' Insurance Co-operative was founded on 1st January 1899, that could operate for only fifty years, still, it had a dominant importance in establishing the fundamentals of insurance. This was the time when the National Insurance Company was establishment, as a result of merging the First Hungarian General Insurance Company and the Farmers' Insurance Co-operative. Today, only 4 of the 28 insurance companies operating in Hungary offer agricultural insurance (Allianz Hungária Biztosító Zrt., OTP-Garancia Biztosító Zrt, Generali-Providencia and Argosz). As it is shown in Figure 5, the market shares of the main insurance companies were the following in 1997: Generali Insurance company: 34,3%; Allianz Hungária Biztosító Zrt.: 25,1%; ÁB-Aegon: 23,1%; Argosz insurance company: 12,4%; Garancia Biztosító Zrt: 2,9%; Associations: 2,2%, Colonia insurance company: 0,1%. Meanwhile, Colonia and ÁB-Aegon insurance companies left the market of agricultural insurances. In 2007, Allianz Hungária Biztosító Zrt. managed to remain the company with the highest market share (39,1%), Garancia Biztosító Zrt. was the second one (31,2%), followed by Generali Providencia (18,9%), Argosz insurance company (8,7%) the Associations (2,1%).

Agricultural insurance associations are companies working on the basis of mutalism

The agricultural insurance associations are companies working on the basis of mutualism which were established for fire, hail, thunderstorm, spring frost, crop and animal insurance. Currently, there are 35 insurance associations operating in Hungary, four of which are members of MABISZ (Association of Hungarian Insurance Companies): Dimenzió; Traffic Insurance Association, that also carries out obligatory liability car insurance activities; TIR Insurance Association and MÁV General Insurance Association. Their role can significantly increase in the future, as the mutual trust among enterprises and the social cooperation strengthens.



Source: Zöldség- és gyümölcspiac, 2007

Figure 4: Frost damages of sour cherry between 23-24th April and 2-4th May 2007 (%)

Nefela association for hail suppression in southern Hungary achieved remarkable results in protection against hail damages

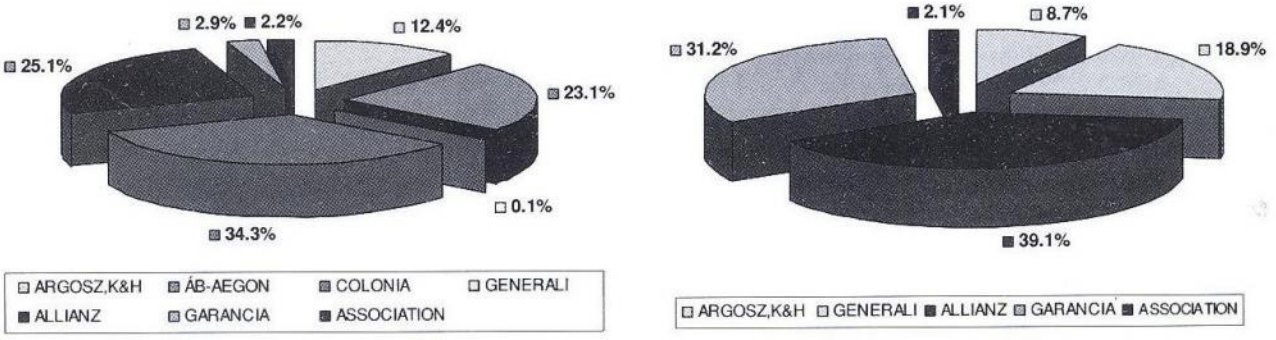
NEFELA association was established by more than 100 agricultural big farms, 2 insurance companies and the Hungarian Meteorological Service (OMSZ) in 1994. Nefela operates 104 ground generators in the area of Somogy, Baranya and Tolna counties. Due to the data of the Association, hail suppression is capable of saving a production value of 16.5 HUF by 1 HUF expenditure (*Internet 1*).

Ground generator hail suppression system is used on 9 million hectares in France, on 2 million hectares – that is, the whole agricultural area – in Croatia and on 600 thousand hectares in Spain. Besides this, airplane hail suppression (in Austria, Germany and Greece) and anti-hail rockets (in the former Yugoslavia, Slovenia, Ukraine, Moldavia, Bulgaria) are also used in Europe to reduce hail damages (*Nefela*).

Producers' biggest problem concerning risk management carried out by insurance companies is that the profitability of agricultural production is relatively low and insurance companies' profit-orientation resulted in the reduction of the range of risks and a very strong method of classifying risks from 1991 (*Márki*, 2001).

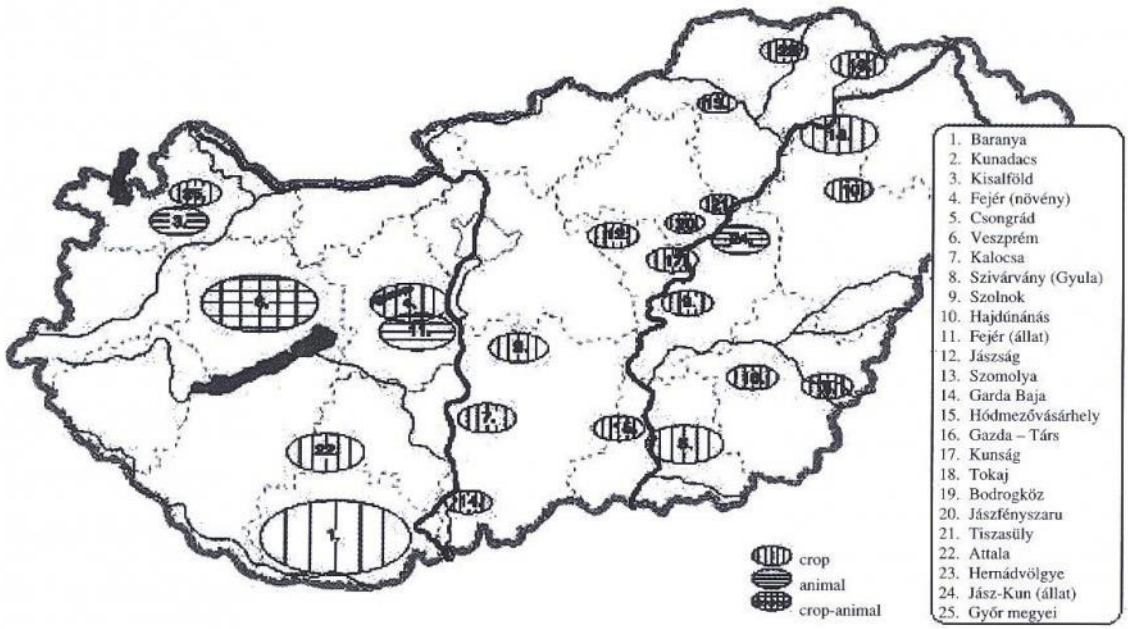
In Hungary, agricultural insurance fees are among the last cost items and usually there is not enough resource for them, as opposed to EU Member States, where insurance fee is also included in the planned productions costs. While it is still a question for a Hungarian farmer to whether or not take out an insurance policy concerning the produced crop, it is almost a fundamental condition in EU Member States.

As a result of climate change, due to the extreme natural damages with unpredictable outcome, there is a need for separate EU and national strategies and regulations concerning the elaboration of the optimal conditions of farming, the subsidisation of damage prevention and the successful operation of risk protection institutions. The regulation is decent only if producers make use of the three-step protection system – mitigation system, commercial insurance companies and the non-profit insurance associations of producers – described in the article. There is a need for multilateral protection and collaboration in order to moderate the considerable risks. As for producers, it is



Source: MABISZ, 2007

Figure 5: Market share of insurance companies'agricultural insurances in 1997 and 2007 (%)



Source: K&H Biztosító Zrt., *Márki, J.*, 2006.

Figure 6: The location of Agricultural Insurance Associations in 2006

important to determine the adequate proportion of risk-reducing expenditures and the services provided in exchange. Nevertheless, this also calls for the thorough analysis of the risk occurrence of the given site and crop, the conscious usage of damage prevention technologies and the selection of insurance system whose price level conforms to the requested damage service.

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