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# HUNGARIAN AGRICULTURAL RESEARCH

December 2018

**Environmental management, land use, biodiversity**

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# MEGJELENT

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A kiadványban megtalálható az összes hazai faj minden igényt kielégítő bemutatása, amely teljes körű tájékoztatást nyújt a szakembereknek és a lelkes természetbúvárok számára is. A több mint háromszázötven részletes illusztrációt tartalmazó kötet értékét tovább növeli a képanyaga, amely kétszáz művészi igényű színes fotót tartalmaz, ezzel felveszi a versenyt a hasonló tárgyú angol, német és francia nyelvű európai munkákkal. Hiánypótló a kétszázkilencven oldalas kötet abból a szempontból is, hogy részletesen tárgyalja a kifejlett állatok mellett a lárvákat is, jól használható határozókulccsal ellátva. A könyv további célja, hogy minél szélesebb körben népszerűsítse a rovarcsoport megfigyelését és megbecsülését.

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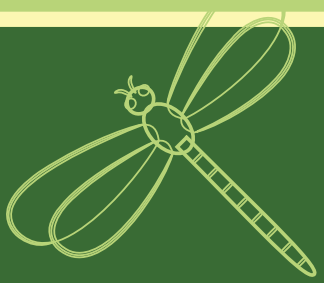

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# FIVE OF THE YEARS OF THE „GREENING" IN NUMBERS

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## ABSTRACT

Békés County has good agricultural qualities: one of these important qualities is the high quality arable land. Almost the whole area of the county is used for arable farming. Apart from the high quality crops it is important that high production rates are typical at this area. Due to these factors set-aside was not common practice only were used where crop rotation and agrotechnics required it. The Common Agricultural Policy (CAP) called Agenda2000 already suggested the requirement of set-aside, however, it was not used by Hungarian farmers for years in practice. The latest reform generated by the CAP has brought many new requirements for farmers related to the payment of agricultural support. Among these are the spectrum of greening requirements. During our research we examined the land using data in the county from 2009 to 2018. We analyzed the statistics from the perspective of area-data and use of land. We determined that in the general crop rotation of the farms, the area of a few main crops was typically decreased and plant diversification in agricultural areas grew, the ratio of set-aside lands significantly increased to the „disadvantage" of cultivars. Support dependent on plant-based production only caused an increase in cultivated areas in a few cases. It is apparent that the county's cultivation structure has changed greatly in the past nine years in the interest of maximum access to agricultural support via the CAP reforms, however, in the case of certain emphasized crops, the desire to produce has not grown despite production-dependent support.

**keywords: common agricultural policy, direct payment, greening, diversification**

## INTRODUCTION

The European Union has several common policies to ensure unified administration within its borders. One of the most important of the special policies is the Common Agricultural Policy, or CAP (Somai 2014). In its 2014-2020 cycle, the CAP fundamentally changed the system of direct payments, introducing the idea of "greening". With regards to agricultural production, Békés county plays a nationally important role. In 2018, 14,409 producers submitted claims for 438,651 ha of land. This puts the county fourth in the country in terms of number of claimants, and second in terms of total area claimed. The national average for size of ownership in 2018 is 28.29 ha, and in Békés county 30.44 ha, close to the national average. These two preceding figures place Hungary roughly in the middle of the world average with respect to size of land owned (Horváth –Komarek 2016).

For data on county-level productive land, I use the data of the Békés County government (Békés Megyei Kormányhivatal, BMKH 2018), (Table 1)

From the data in the table, we learn that in terms of crop rotation, five crops account for roughly 60-80% of the arable land use from year to year. We can see that the area in which the main crops were sown has been declining steadily: between 2009 and 2016, the area in which the main crops were grown declined by 10%, roughly 45,000 ha, replaced by other plants. In case of corn, the decline was steady until 2016, and from 2017 began to increase again, surpassing 103,000 ha again in 2018. For wheat, the decrease was sharper, reaching its low point in 2017 at around 82,000 ha. In 2018 the area sown with wheat again jumped, totalling over 100,000 ha. The explanation for this, too, lies in the market demand, but agricultural support criteria also played a role. During the period under consideration, producers sowed roughly the same area with sunflower, canola, and barley in the county, though the land devoted to canola jumped in 2018. This also means that the total area devoted to "other" seeds grew continuously from 2009 to 2017. In the later years, the fraction of the land left to rest also increased to several times the area that was left to rest in the first year.

An important element of the European Community's agricultural policy is the idea of letting land rest, via set-aside payments (Divéky 2006). The CAP-reform of 1992 brought substantial changes to rural agricultural development, as did the Agenda2000 reform that followed it. The former introduced mandatory land set-aside (Francsovics 2006). From 2000 on, the CAP emphasized environmental and

**Table 1: The main crops with its sowing area between 2009 and 2018 (BMKH 2018)**

| crops | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| maize | 113 639 | 106 444 | 119 885 | 111 319 | 95 896 | 93 935 | 93 508 | 85 935 | 102 259 | 103 842 |
| wheat | 108 745 | 100 082 | 90 591 | 105 184 | 110 150 | 105 091 | 89 710 | 90 415 | 82 269 | 104 224 |
| sunflower | 74 238 | 63 748 | 71 929 | 71 254 | 73 849 | 70 242 | 76 376 | 73 596 | 71 099 | 77 039 |
| rape | 15 983 | 13 415 | 18 546 | 5 504 | 12 469 | 16 028 | 13 321 | 14 928 | 17 331 | 24 416 |
| barley | 27 108 | 26 136 | 15 235 | 20 903 | 24 318 | 26 999 | 26 398 | 30 807 | 21 842 | 21 961 |
| *areas of main crops* | *339 714* | *309 827* | *316 188* | *314 165* | *316 684* | *312 297* | *299 314* | *295 683* | *294 802* | *331 482* |
| other crops | 91 321 | 113 435 | 111 614 | 116 656 | 111 982 | 118 956 | 119 918 | 125 909 | 133 824 | 97 283 |
| *areas of main+other crops* | *431 036* | *423 262* | *427 803* | *430 822* | *428 667* | *431 253* | *419 233* | *421 593* | *428 626* | *428 766* |
| fallow areas | 1 109 | 9 073 | 5 429 | 2 439 | 2 332 | 1 619 | 13 215 | 15 334 | 8 524 | 9 884 |
| total area | 432 145 | 432 336 | 433 232 | 433 261 | 430 999 | 432 873 | 432 449 | 436 928 | 437 151 | 438 651 |

ecological protection, and rural development, which is reflected in the system of common finances (Rákóczi – Barczi 2015, Veysett et al. 2005). "Greening" was introduced as part of the "Greening" resolution, 10/2015. (III. 13.) FM resolution for climate protection through improved agricultural practice. The resolution requires that all producers with at least 10 ha of land must produce at least 2 kinds of plants, and those with more than 15 ha of land must ensure that 5% of the land meets EFA standards, while those having more than 30 ha of land must produce at least 3 kinds of plants (Hart 2015).

The CAP for budgetary years 2014-2020 set limitations on animals, vegetables grown on arable land, fiber and protein crops, with various levels of support and conditions. The primary goal of the support was to increase the agricultural production, and to reduce the country's dependence on these crops (Rákóczi 2017).

In the course of this research, I attempt to answer the question of whether the latest CAP reforms have resulted in a visible change in the ratio of crops sown in Békés county, and its land use. Orbán (2008) has previously performed similar research trying to find correlations in the 2007–2013 planting cycles.

## MATERIAL AND METHODS

For my data I used the BMKH (the Békés County Government's) unified county-level survey of land use between 2009 and 2018 in Békés county. I compared the land area of conventional crop plants within each year, as well as year-over-year. I compared this with the land areas of other plants as well, and also compared it with the area of land set aside to rest. I compared the data in Microsoft Excel as percentages of changes from year to year, and also used *time series* analysis to compare the different fractions of land use. To test my 2nd. hypothesis and to examine the fractions of different areas, I examined the years 2009 through 2018 again as percentages. For the quantity of land set aside to rest, I used the IBM SPSS Statistics 23 statistics program to find Pearson correlation coefficients as part of my analysis.

## RESULTS AND DISCUSSION

Table 2 illustrates the proportion of each plant sown in the given year as a percentage of the total arable land area. The last column shows the size of the change from

**Table 2: The yearly proportion of the crops inside all of the areas**

| crops | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | measure of change 2009–2015 %-point | 2009-2018 %-point |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| maize | 26 | 24 | 27 | 25 | 22 | 21 | 21 | 19 | 23 | 23 | -5 | -3 |
| wheat | 25 | 23 | 20 | 24 | 25 | 24 | 20 | 20 | 18 | 23 | -5 | -2 |
| sunflower | 17 | 14 | 16 | 16 | 17 | 16 | 17 | 16 | 16 | 17 | 0 | 0 |
| rape | 3 | 3 | 4 | 1 | 2 | 3 | 3 | 3 | 4 | 5 | 0 | 2 |
| barley | 6 | 6 | 3 | 4 | 5 | 6 | 6 | 7 | 5 | 5 | 0 | -1 |
| *areas of main crops* | *78* | *71* | *73* | *72* | *73* | *72* | *69* | *67* | 67 | *75* | -9 | -3 |
| other crops | 21 | 26 | 25 | 26 | 26 | 27 | 27 | 28 | 30 | 22 | +6 | +1 |
| fallow areas | 0,3 | 2 | 1 | 0,6 | 0,5 | 0,4 | 3 | 3 | 2 | 2 | +2,7 | +1,7 |

2009–2015, and the size of the change from 2009-2018, as percentages. The share of corn grown showed a steady decline all the way until 2016, before beginning to rise again. This same trend was also visible in wheat. Sunflower and rapeseed maintained a more steady share year over year. Although the share of wheat grew, overall the total land it was sown on decreased. When looking through the data in the table, it becomes apparent that in the 2010s, the 5 chief varieties of crops each lost share of the total crop area, while at the same time other plants, and the share of land that was left to rest, grew. One way to see the growing diversification of crops is to notice that the share of the five main crops decreased by 11% through 2017, though it did begin to rise again in 2018. At the same time the percentage of the crop devoted to other plants, or to resting the land, increased, particularly in the last three years. In 2018 the share of land used for these crops surpassed the share from 10 years earlier.

It is apparent that the introduction of "greening" rules led to a substantial reorganization in the land usage devoted to the various crops, since the change was particularly sharp around the year these rules were introduced. At the same time it must be said that 3-4 years after the introduction of these rules, the landowners were able to find ways both to meet the guidelines and fine-tune their crop shares in response to market needs. The quantity of land supported for growing each of the crops is shown in Table 3.

It can also be seen that only certain plants benefited from increased sowing, since from 2010 and 2018 the amount of land devoted to sweet corn grew by 22%, but in the intervening years, the values changed chaotically, and the maximum land devoted to sweet corn was in 2014, at a time when the plant wasn't even supported directly. A similar trend can be observed with dried peas, cantaloupes, and tomatoes. Green peas, soy, and alfalfa definitely saw increased sowing in the year the support was introduced. Nevertheless, the size of land devoted to watermelon shrank in spite of the support, dropping to nearly half its size during the period under examination. We can deduce that the agricultural support for fibrous and protein crops and field vegetable production only partially met its goal. The land data for the main types of plants that receive agricultural support are summarized in Table 4.

The land area used for apple production fell by nearly 23% through 2017, while in 2018 it began to grow. The same trend can be seen in the case of sour cherries, with a total of 17%. The land devoted to peaches shrank by 47% and that devoted to plums by 3% between 2010 and 2018. The land area devoted to walnuts and almonds grew, but the area for peanuts decreased. The level of support is relatively high for these plants, but at the same their production does require a certain specialized knowledge, which takes away from farmers' willingness to invest in growing these crops.

The amount of land set aside to rest in the county clearly grew from 2015 on (Figure 1). In 2010 the total size of

**Table 3: The area's of supported crops between 2010 and 2018**

| crops | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | change (2010-2018 %) |
|---|---|---|---|---|---|---|---|---|---|---|
| sweet corn | 2 104 | 3 032 | 3 460 | 2 761 | 3 205 | 2 974 | 2 709 | 2 693 | 2 710 | +22 |
| sugar pea | 2 090 | 2 531 | 3 127 | 2 130 | 2 328 | 2 920 | 3 893 | 3 594 | 3 269 | +36 |
| field pea | 3 639 | 2 562 | 2 802 | 2 656 | 3 307 | 3 270 | 3 567 | 3 741 | 2 366 | -34 |
| soya bean | 2 852 | 2 180 | 2 044 | 1 727 | 1 292 | 5 129 | 3 545 | 5 182 | 3 449 | +17 |
| water melon | 2 911 | 2 294 | 1 749 | 1 960 | 2 065 | 1 700 | 1 842 | 1 678 | 1 544 | -46 |
| shoneydew melon | 93 | 87 | 85 | 88 | 79 | 85 | 113 | 99 | 76 | -17 |
| tomato | 667 | 447 | 79 | 293 | 469 | 588 | 523 | 606 | 762 | -12 |
| alfalfa | 15 545 | 15 088 | 14 141 | 13 888 | 14 719 | 17 051 | 17 070 | 18 175 | 19 521 | +20 |

**Table 4: The area's of supported plantation (Unit: %)**

| type of plantation | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | change (2010-2017 %) |
|---|---|---|---|---|---|---|---|---|---|---|
| apple | 85 | 84 | 88 | 86 | 81 | 78 | 78 | 69 | 87 | +2 |
| nut | 168 | 168 | 170 | 168 | 168 | 169 | 174 | 176 | 203 | +16 |
| almond | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | +2 |
| sour cherry | 177 | 180 | 135 | 133 | 134 | 147 | 159 | 159 | 214 | +17 |
| hazel-nut | 61 | 61 | 60 | 61 | 61 | 60 | 60 | 58 | 55 | -8 |
| peach | 27 | 29 | 27 | 30 | 30 | 26 | 26 | 19 | 14 | -47 |
| plum | 191 | 186 | 186 | 181 | 181 | 184 | 187 | 172 | 185 | -3 |

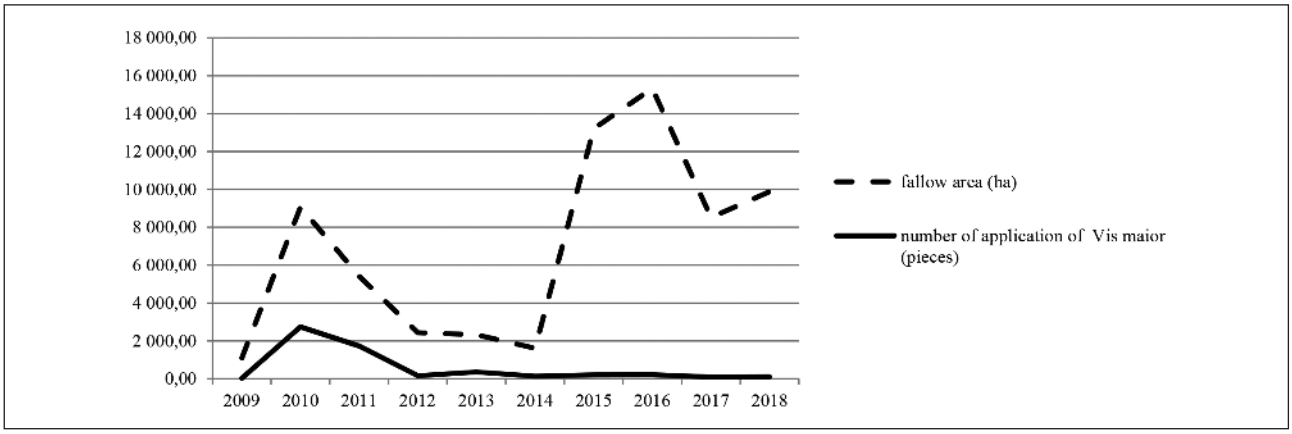


**Figure 1: The fallow area**

the land left to rest increased by a factor of about eight, which might be clearly explained by a concurrent period during which groundwater swelled. This interpretation is supported by the sudden increase in the number of vis maior or force majeure claims. In 2010, there were a total of 2,746 vis maior claims for 9,073 ha of set-aside land, which by 2016 grew to more than 15,000 ha. A Pearson correlation analysis showed a significant correlation at the 0.01 level, meaning that from 2009 to 2014 a clear correlation can be shown by the amount of resting land and the number of vis maior claims. The same analysis between the years 2009 and 2016 showed that no correlation can be shown between the land data and the number of claims. In 2018 the amount of land set aside to rest again grew. It can be seen that until 2015, when new CAP rules were introduced, land had been set aside to rest mainly due to weather conditions, but afterward some land was set aside due to the new rules.

## CONCLUSIONS

In the county, in the percentage of crops sown, and with respect to crop rotation, a significant restructuring can be observed in agricultural production over the past 10 years. The "greening" rules had and have an effect on the structure of crops grown, and crop diversity increased. Since the introduction of greening (2015), the structural change has been significant, but it seems to have settled down over the past 3-4 years. The agricultural support for plants have only partially succeeded in their goals, and the share of certain plants has grown recently.

## ACKNOWLEDGEMENTS

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# HARVESTING DURING THE PROCESS; AGRICULTURE IN DEVELOPED WASTEWATER TREATMENT PLANTS

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## ABSTRACT

Agricultural product, especially season- and climate-based food products became more important in the last decades. The human population crossed seven billion habitants, and the globalization showed up new opportunities on the food market, foreign-imported vegetables and fruits, exotic products, all over the world. Wastewater treatment developed more in the last two decades as well, than in the last century. Many new options came out, reflected to the different needs, like urbanization, or farm or agriculture territories, lack of water, or even financial opportunities. While most of the wastewater methods are based on swamps, wetland areas, wetland plants and actually maybe the whole macrofauna, an idea came up, to use plants with 3rd party benefits, such as usage in the energy field, or even in food or catering application.
Three different types of plants where examined, in three different aspects, such as growing, nutrient absorption, pollution absorption, even environmental polluting component accumulation or Vitamin-C containing.

**Key words: wastewater, food production, accumulation**

## INTRODUCTION

Food producing, to satisfy both the quantity and the quality demands, is facing more and more difficulties year by year, decade by decade. It was turned out also, that the agriculture makes as many different impacts on the environment, as the industry, or transportation. Using obsolete agriculture methods and technics are dangerous, meanwhile there are lot of territories using them, because these methods where discovered or developed in the eras, where the environmental protection was not an important aspect, but even it was not a point at all. Maximizing the product quantity, using many chemicals to fertilize, or as insecticide was not discovered as an issue, as an issue on long term. Nowadays the humanity discovered, that we learned it by the hard way (again), that industrial sized food producing is not just a basic level multiplying, like three times more water, three times more fertilizer means three times more product.
As the human population grew, lack of food grew with it, so safety and quality fell from the top priority, and food producing at in any rate became the priority, such as exporting. Deforestation, overfishing, salinization, desertification, these events became faster and bigger, and as it always, the bill was showed up. The imbalance where not erased, however it is bigger than ever in the human history.
By the fifties, it was discovered, that human activity, and human urban lifestyle makes a huge impact on the environment and the nature, and by the seventies it was already a fact, that this wasteful lifestyle should be changed by international collaboration. In the average human mind, it was just a new problem, they didn't feel the importance. "Luckily" many environmental catastrophes happened, so are polluted elements where shown the population, while there are still territories didn't change their minds by many aspects, like financial, by religion or faith, or educational causes, mostly in the developing countries. But there are many great and successful pursuits and purviews to save the humanity from, let's face it, itself.
Brand new technologies to produce energy, brand new architectural methods, using less materials, and one of the most important is recycling. Recycling waste, recycling materials, and recycling water, which is now as we know is the base of the life. Water recycling, or as we know it better water treatment or wastewater treatment, has the purpose to treat the water used by human population or industry as much, that the release to natural water surface should not be a harm, or should not have any biological or chemical hazard (EPA, 1999).
Firstly, the wastewater treatment was a copy what the nature does. The activated sludge technology was based on the attributes of lakes, smaller creeks, and swamps (Metcalf and Eddy, 2003). It is a well operated, easy designable technology, and still the most common technology in all over the world. But, the biological footprint is

very big, the instrumentation needs a lot of power, and repairing and retrofitting is not an easy task, while most of the instrumentation is hidden. It has a big biological hazard, and redesigning is almost impossible. While the biology gained fresh knowledge about the micro- and macrofauna in the eighties, new horizons opened in the biological methods, such as wastewater treatment.

As we learned much about the microscopic world, we understood their lifecycles, we began to process technologies based on this new knowledge. We discovered, that emulating a swamp environment is good, but adding more elements like plants, even insects, fishes, or simply create a food chain can shows more efficiency. The setup time shortened, the biological hazard reduced, so as the mal-odors, the whole treatment system was stabilized, the operating became safer, needed less energy. While brand new systems were processed toward by companies and universities (MBBR, FCR, UCT), the plants became unnecessary, while the microfauna solved all the deserved issue (Lekang and Kleppe, 2000).

But in the developing countries, mostly in Africa, Asia and South America, the environmental invest and develops are much slower. While they have different financial status, they have different level of education, and they have different attitude for the environment, the importance of these investments are mostly unclear to them. They accept new technologies, when benefits are touchable, or countable, they don't accept anything that they can see with eyes. Benefits as energy, or food is acceptable

## MATERIAL AND METHODS

While using plants to develop wastewater treatment is an accepted method, the ideas came up, to use plants with extra benefits. Energy reed, energy trees are very common. While they are growing faster in the treatment plants, they can harvest 4-6 times in a year, counter to field production. There is no need for special examination of components, there is no biological hazard, while these plants, plant parts will burn in the muffles, transforming heat energy, which can be transformed to electricity, and the ashes mostly does not have any chemically hazardous component. Harvesting and gathering the landfill gases, the whole system can bear itself with electricity and heating, so the investment can return in a few years, beside its purpose, to treat wastewater.

But other ideas came up in territories with lack of food production, that these plants maybe can help starving. Maybe for human consumption, maybe for foraging, and maybe for pharmaceutical production. Of course, chemical hazard became the main question, if the plants absorb compounds. Which are the compounds that they can transform, which are the compounds that they accumulate. Which part of them is accumulating, the leaves or the fruits, and does those compounds causes any impacts in the human body?

First of all, it has to be clear, not every plant is applicable for this special environment. There are many criterions, that has to be complied. Huge water exposure, huge nutrient exposure, very big sunshine exposure, the plants needs to be resistant to fungis (because of the high level of vapor) and need to be resistant for several plant diseases. The temperature is various, it depends on climate options, it depends on if it is in greenhouse-designed facility, or a wetland design. In this study we examined three plants: the italian reed (*Arundo Donax*), chili pepper (*Capsicum Annuum*) and banana (*Musa Acuminata,* Figure 1.). The plants where growing in a greenhouse-designed FCR typed wastewater treatment facility. The average annual temperature was 24 Celsius degree, the average humidity was 100%. We measured the average growing, we measured the number of the crops, and after harvest we measured nitrate, nitrit, ammonium, and phosphorus accumulation. We picked 5 plants of each species for the examination.

**Figure 1: Young banana growing in wastewater**

The dimensions measuring was made by hand, and a ruler, the laser measuring technology was not necessary in this case. In the laboratory measurement, while the equipment was calibrated to water measuring, we made a suspension with 100g of crop and 100g of distilled water. When the suspension was homogenous enough, we filtered 100mg of it with Machery Nagel porafil 0,45mm filter. We measured the filtered liquid with Machery Nagel quick tests, Nanocolor orto-Phosphate 15, Ammonium 3, Nitrate 50, and Nitrite 4. We repeated the measuring 3 times, and we counted an average. While the reed doesn't have any usable crops, and the reed is used only for energy production, it has only growing data.

It has to be noticed, that all the plants were planted in a sewage facility, that treating municipal waste water, so huge metal, or hydrocarbon loading was not present.

**Figure 2: Plant in the wastewater treatment plant**

plants are growing faster, then the others, who has no roots in the wastewater. The reed grows almost 2cm for a day, the pepper grows around 8mm for a day, and the banana grows 1,3 cm for a day. Compare to the control group the reed grows 33 % faster, the pepper grows 100% faster, and the banana grows more then 500% faster. The counting of the crops was not accurate, while the banana grows bunches, and the peppers where too young to count, we used different plants for measuring the growing, and different plants to examine the accumulation. While that is noticeable that the limits are high, we can determine, that the consumption ports risk, that is why an idea came up, to

**Table 1: Accumulation of nitrogen forms in the examined crops**

| | Arundo Donax | | | | | Capsicum Annuum | | | | | Musa Acuminata | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrit | n.a. | n.a. | n.a. | n.a. | n.a. | x | x | x | x | x | x | x | x | x | x |
| Nitrate | n.a. | n.a. | n.a. | n.a. | n.a. | 0,1 | 0,3 | 0,1 | 0,2 | 0,2 | 0,2 | 0,4 | 0,1 | 0,4 | 0,4 |
| Ammonium | n.a. | n.a. | n.a. | n.a. | n.a. | x | 0,1 | x | x | x | x | 0,1 | x | 0,1 | x |

All values in rows measured in mg, in 100g dry material and 100g distilled water

**Table 2: Shortened 31 day measuring period for growing**

| (days) | Arundo Donax | Arundo Donax Control | Capsicum Annuum | Capsicum Annuum control | Musa Acuminata | Musa Acuminata control |
|---|---|---|---|---|---|---|
| 1st day | 10 | 10 | 3 | 3 | 120 | 120 |
| 6th day | 21 | 16 | 5 | 4 | 127 | 121 |
| 11th day | 31 | 22 | 9 | 5 | 136 | 123 |
| 16th day | 41 | 28 | 12 | 7 | 142 | 124 |
| 21th day | 51 | 34 | 15 | 11 | 148 | 126 |
| 26th day | 60 | 41 | 21 | 13 | 155 | 127 |
| 31th day | 72 | 47 | 27 | 15 | 161 | 129 |

All values in rows measured in cm, from ground

## RESULTS AND DISCUSSION

The results in Table 1. one shows, that the accumulation of nitrate is detectable, but the values are low, so for human catering it is not the best option, but in "lack of food" areas it can give an alternative. It can give an alternative in forage, while it is always a mixed production. While the reed doesn't have any crops, measuring was not an option, and it has to be mentioned also, that the reed transform energy by incineration, there is no hazard in the left ashes. According to EFSA's, or FDA's limitation the current acceptable daily intake (ADI) for nitrates is 3.7 milligrams per kilogram of body weight per day (mg/kg bw/day). The safe level for nitrites was re-established at 0.07 mg/kg bw/day, close to the slightly more conservative existing ADI of 0.06 mg/kg bw/day, it is a lower value (EFSA, 2017).

Ammonium was measured one time in the pepper suspension, and two times in the banana, but these data needs remeasuring, while these values are too low, to measure accurately.

Measuring the growing (Table 2), it is noticeable, that these avoid human consumption, or forage, maybe these harvests can be used as medical production, that is why we wanted to measure Vitamin C, but without control group there was no point of the measuring. Our opinion is, that it can be a nice alternative, but still needs more examination, because food safety is just important as food quantity.

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# WILDWATCHER PROGRAMME: VOLUNTEER BASED, BIODIVERSITY DATA-COLLECTOR SYSTEM RESULTS OF THE FIRST TEN YEARS

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## ABSTRACT

Halting the loss of biodiversity is one of the biggest challenge of our century. The observation of the widespread and relatively frequent species often means a non-executable task for the experts. The WildWatcher programme started in September 2009 aims to involve the public in this activity provides a huge amount of valuable data and plays a significant educational role. At the beginning of the programme the data of 9, at present the data of 18 easily recognizable, widespread, protected animal and plant species can be recorded with the help of a GoogleMap based website. The data are validated by specialists before adding them to a database. 9833 observations of about 2800 participants were recorded during the ten-year-long operation. We have received the most data about the Hedgehog (*Erinaceus roumanicus*), but the Squirrel (*Sciurus vulgaris*) and the Stag-Beetle (*Lucanus cervus*) are also among the winners. The Spring Pheasant's eye (*Adonis vernalis*) was the most „popular" out of the plant species, followed by Snowdrop (*Galanthus nivalis*) and Greater Pasque Flower (*Pulsatilla grandis*). The data recorded until now show that a large number of volunteers join with pleasure the survey of the easily recognizable species and the data provided by them contribute to the nature conservation work as a valuable input. Different examples of potential data usage demonstrated in this article to show the marvellous value of volunteers data collections.

**keywords: volunteers, data service, environmental education, protected species, distribution, Hungarian Biodiversity Monitoring System, Hungarian nature conservation, protected species, Web2.**

## INTODUCTION

One of the biggest challenge of our century is to stop or at least reversing biodiversity loss (European Committee 2011). Without developing an environment-friendly thinking of all society groups and a progressive implementation of a changing approach, the targeted nature-conservation goals will be doomed to failure. One of the highly effective instruments of sensitization to the living nature is a deeper social involvement into the practical nature conservation's work (Dimitrakopoulos et al. 2010). Most of these tasks require certain expertise, physical workforce capacity and often special tools too, which may limit the number of potential volunteers. Thereby, we have to honour any opportunity, where none of the premised limitations appear, and we can mobilise masses to execute different tasks on nature-conservation (Freitag & Pfeffer 2013). Our ecosystem is such a complex and complicated system, where a lot of impacts and processes affects each other, hence it is practically impossible to understand fully the whole operation. Therefore the measurement of the status of biodiversity can carried out with the examination of a few components, especially indicator organisms of the system. (Horváth *et al.* 1997). In order to measure the nature conservation status and its changes of certain ecosystems, experts are often working to assess properly selected plant and animal species through many years. The number of specialists is limited; accordingly their knowledge and human capacity should be used to solve tasks requiring professional skills. In many cases, in order to reach the best solution of population assessment, the only way is to use easy of attainment methods and synchronised work of many volunteers. (e.g. Szép & Nagy 2006). In these cases, proper expert control is essential. Furthermore, it has a non-negligible awareness-raising effect.

As recognised the importance of awareness-raising, noticed that the Red Squirrel has good reputation and fame in society and finally this species plays a significant role in forest-ecosystem, specialists at the Szent István University, Department of Zoology and Ecology have introduced a so called "Squirrel watcher" programme in 2002. In order to survey the Red Squirrel population in Hungary, a query was created and had been sent to more than 3000 elementary and high school to fill on voluntary basis (Bősze et al. 2003). Responses showed that the society is open and inquire to similar initiatives.

WildWatcher Programme was set off on the pathway of the meanwhile finished "Squirrel watcher" programme in the frame of the Hungarian Biodiversity Monitoring System in 2009 (Váczi et al. 2012). The WildWatcher initiative has a dual aim from the beginnings. On one hand it aimed to involve wide range of the human society into the practical nature-conservation work to raising public awareness and improving environmental education. On the other hand it targeted to collect data of the nature-conservation status of Hungarian ecosystems though controlled assessment of some carefully selected plant and animal species (Figure 1).


**Figure 1: Print screen of WildWatcher's home page**

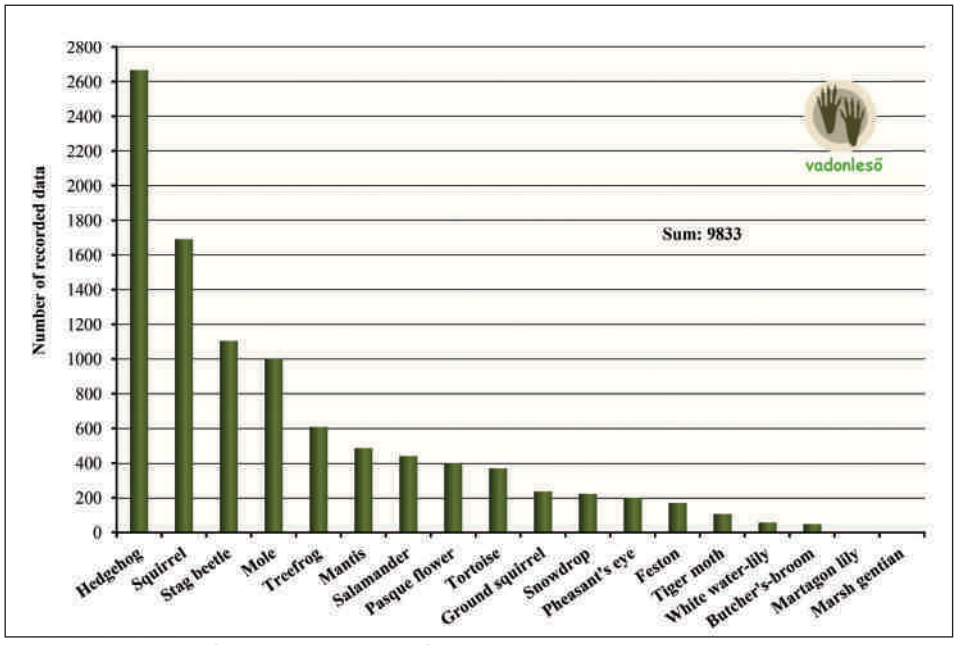


**Figure 2: The number of recorded occurrence of the species**

## MATERIAL AND METHODS

During the development of the WildWatcher website, in co-operation with an image designer and a GIS website developer, we tried to create a friendly, colourful, slightly playful, but not too complicated surface. Because of the instant feedback of recording a data, the users may feel themselves as editors, which is the most important feature of the web2 application. In order to make the website more personal, the team working in the program appears with its own face. As the purpose of the program is dual, we also tried to achieve the two different goals during the selection of species.

First of all, we chose species that are protected by the national law, and there are only limited amount of reliable, recurrent and sufficiently wide-ranging data on

their distribution. They must be as common as anyone can meet them in their wider environment and they must be easily recognizable, so cannot be confused with other species. At the beginning of the programme it was also an important aspect that people should be emotionally attached, so the selected species must had been lovable. For each species, we have given a responsible expert who is responsible for validating their data and responds to the user letters.

The data notification always begins with the spatial localisation of data. On the WildWatcher webpage, a GoogleMap-based map helps the volunteers to mark the location up to a few meters accuracy. When filling in the short dataform, mandatory questions and optional fields are also appeared. Every record is reviewed by the expert who is responsible for the species. Locality, timing of observation, valid email address and any other speciality of the species are checked when validating the records one by one1. The validated records are periodically imported to the Hungarian Nature Conservation Information System (TIR), where they are labelled as "data source: WildWatcher". Subsequently, after further verification and weighting by the type of the data source, the data stored in this database can support the nature conservation authority's decisions, the management regulations and interventions, the national and international reporting obligations and the species protection work.

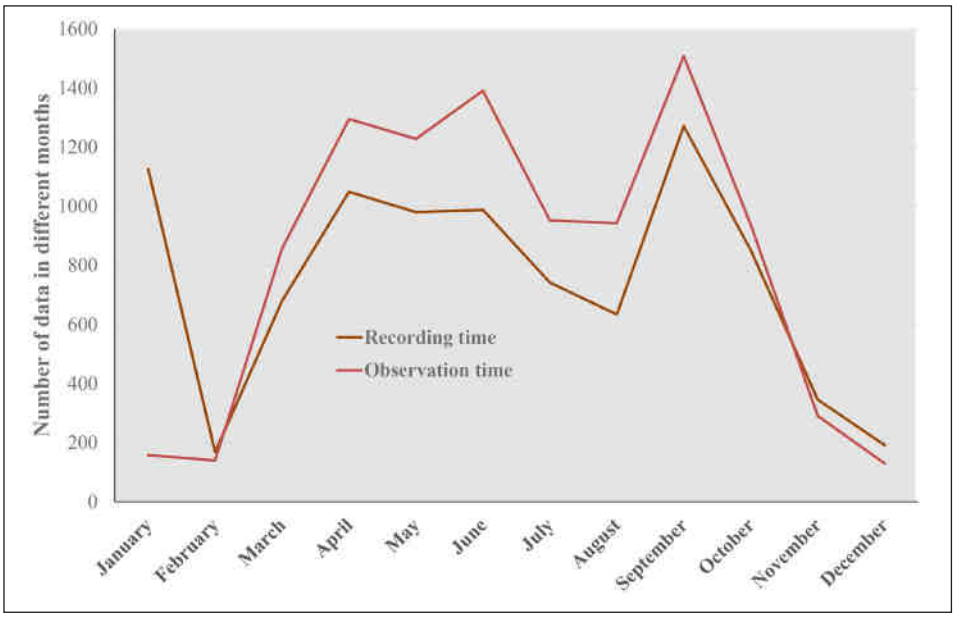


Figure 3: Yearly pattern of observation and recording time of all records

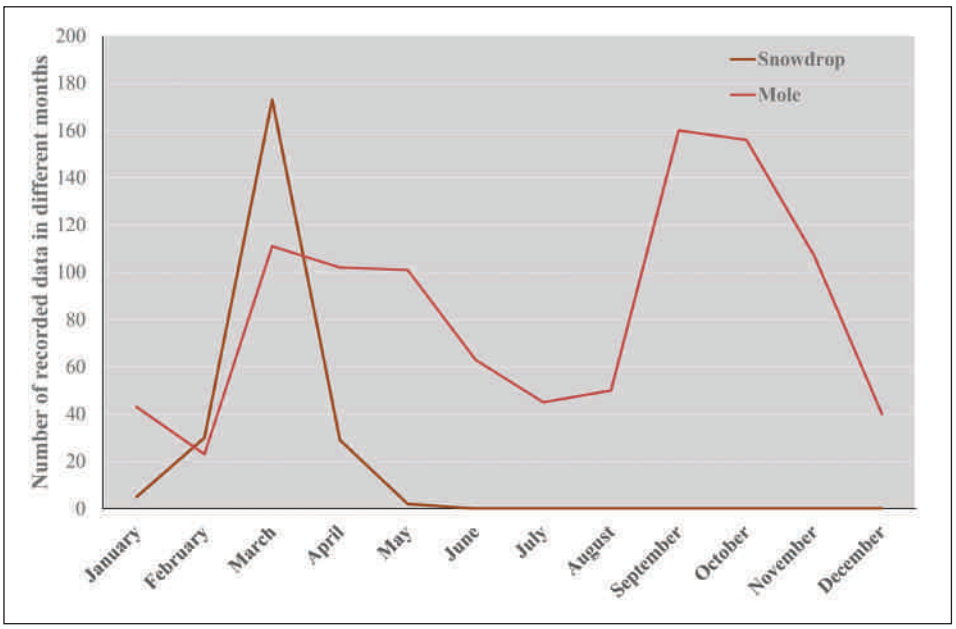


Figure 4: Yearly pattern of observation numbers of Snowdrops and Mole

All (validated and non-validated) observations were used only to characterize the activity of volunteers, meanwhile only validated data were used for the analysis in the case of each species. Numerous analyses and comparisons have been made for each species, but due to space limit we only show selected results that we find the most interesting. We tried to highlight the most typical results to get information about most of the species included in the programme. Species for which very few data were received were excluded from the analyses. Analyses were made in a Microsoft Excel spreadsheet and maps were compiled using ArcGIS 10.6.1.

## RESULTS

There were about 2 800 volunteer provided nearly ten thousand (9 833) record of data during the closely ten years of the operation period of the programme. We had more than one thousand obsessive data provider volunteers, who provided the most amount of distribution data (7 093). Most of the records (98.5%) came

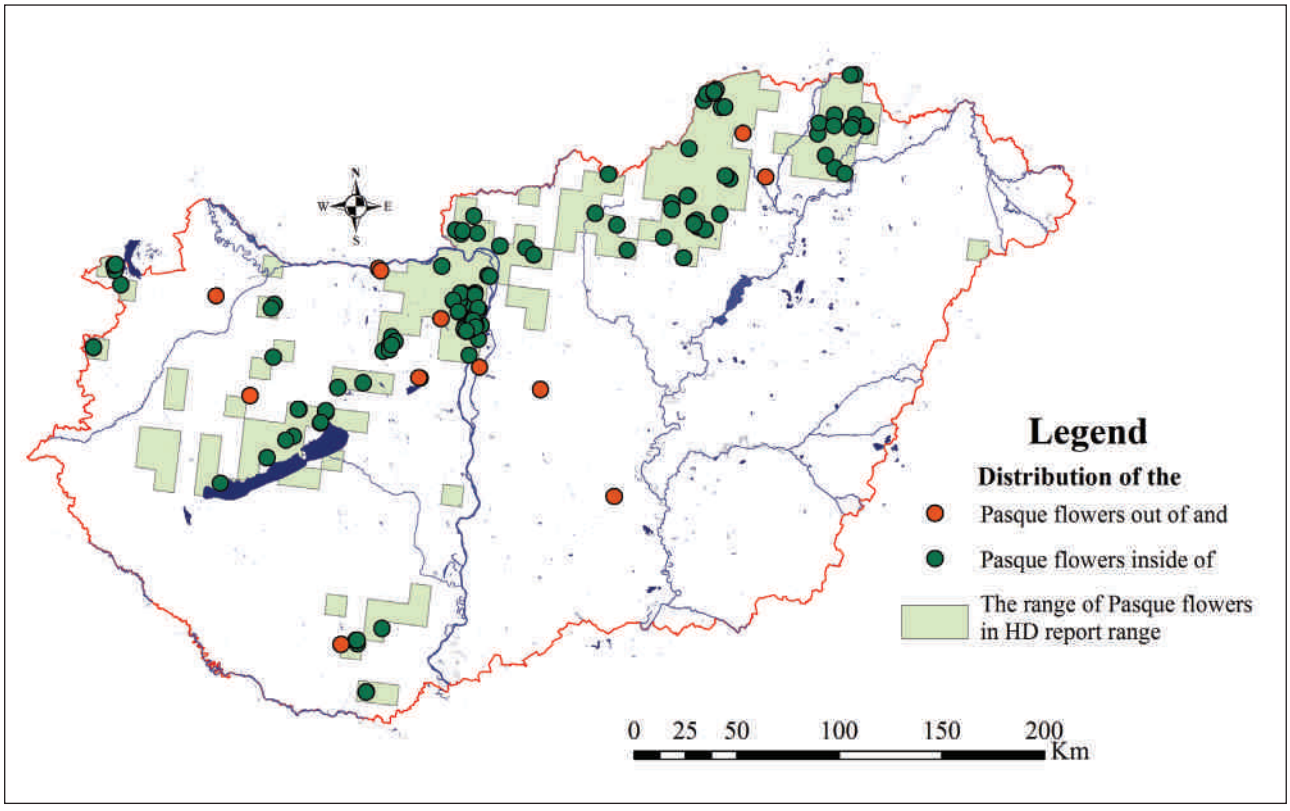


Figure 5: Most of the Greater Pasque Flower's records are insight of its reported range for HD report

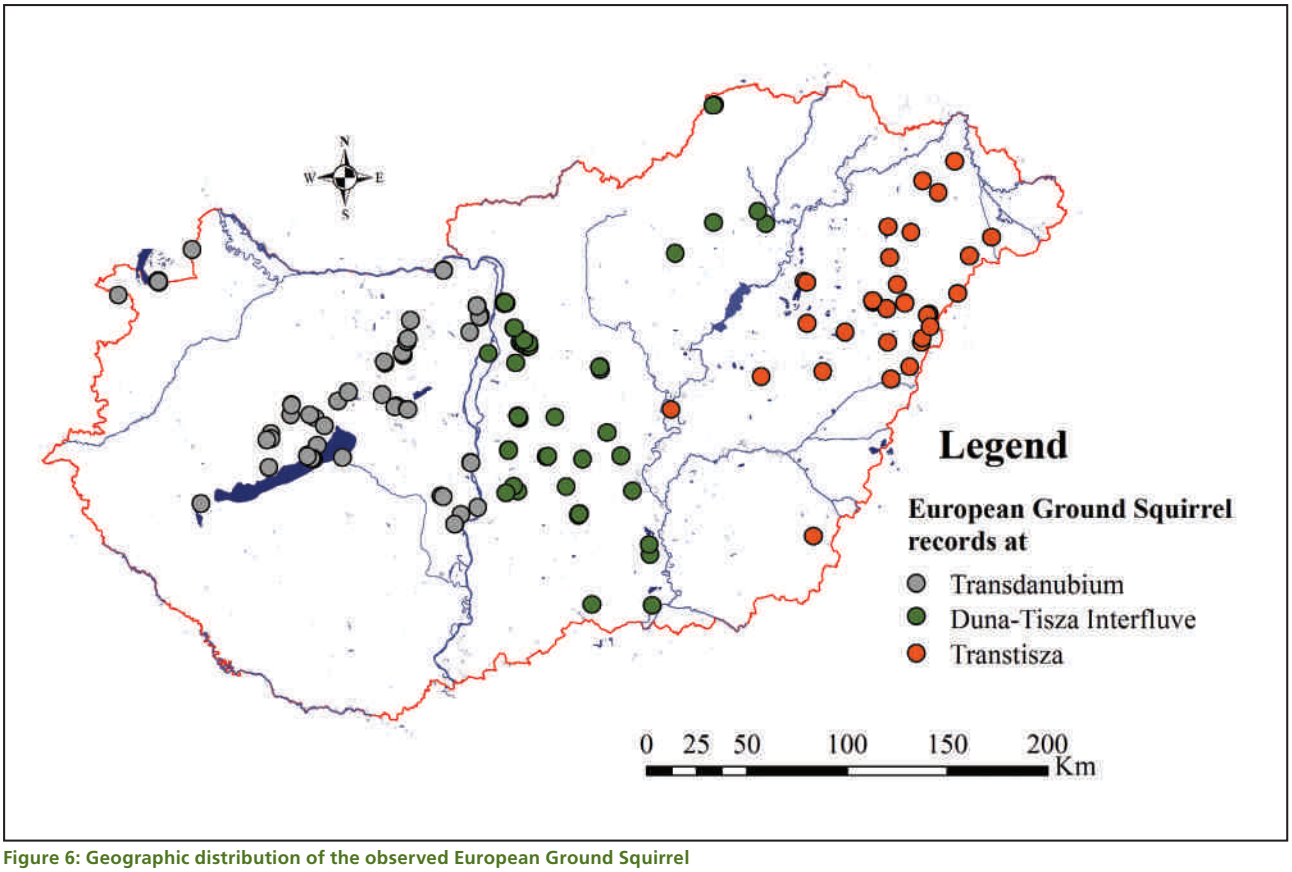


Figure 6: Geographic distribution of the observed European Ground Squirrel

from the area of Hungary, 47.4% of them originated from residential area and 25.5% from protected areas (national protected areas and Natura 2000 sites).

*Figure 2* shows the number of recorded occurrences of the individuals of different WildWatcher species. Yearly pattern of observation and recording time of all records are presented in *Figure 3*. As examples, we also demonstrate the yearly pattern of registration numbers of a plant species, the Snowdrops (*Galanthus nivalis*) with short flowering period and a non-hibernating mammal species the Mole (*Talpa europaea*) in *Figure 4.*

Only 5.4% of all of the Greater Pasque Flower (*Pulsatilla grandis*) records (184) came from outside of the species distribution area reported at the Habitat Directive (92/43/EGK) progress report on second assessment on conservation status in 2013 (*Figure 5*). Most of the observation of Spring Pheasant's eye (*Adonis vernalis*) (91.3% of 400 records) came from rural areas. In spite of this fact 86.0% of the data provider signed as the data came from rural areas and 6.25% skipped to answer to this optional question.

88.1% of all of the registered Fire Salamander *(Salamandra salamandra)* occurrences (412) came from protected areas. 20.2% of available data (109) from the registered European Ground Squirrel *(Spermophilus citellus)* occurrences (203) signed that the mowing was the only field management method, which had been used on the habitat and 68.8% reported that there had been used grazing only. Geographic distribution of the observed European Ground Squirrel occurrences were: 43.9% in the Transdanubium, 40.3% in the Duna-Tisza Interfluve and only 5.6% in Transtisza (*Figure 6*). 28.8% of all of the Hedgehog *(Erinaceus roumanicus)* (2665) observations were reported on roadkilled individuals, 1.8% on died animals in any other reasons and the remained 69.4% on living individuals.

## DISCUSSION AND CONCLUSIONS

Although basically the WildWatcher aims involving Hungarian volunteers, occasionally observations from abroad can be also relevant in connection to better knowledge on the species. There are relatively few volunteers, who are obsessed with collecting data and upload them to the WildWatcher system compared with others who report one data only. In spite of that high proportion of recorded data came from the relatively few obsessed volunteers. Strong motivation factor is


**Figure 7: Volunteers in action**

that the recorded data appears on the map immediately, thus the volunteers feel that they can contribute to make the map more complete. It leads to evolve certain communities, when the volunteers face with others observation next their point on the same species. Helping to clamp these communities a group and a page on social media surface was created.

According to the observations the volunteers meet individuals of WildWatcher species more frequently on non-protected areas not surprisingly because just about one quarter of the area of Hungary is protected (Natura 2000 sites and national protected sites altogether). Accordingly to our goal selection of the species can be concluded as definitely successful in most cases, because volunteers can report most of the species in plenty times even around their residential areas (Figure 7). There are some exceptions. For example Fire Salamander demand a special vulnerable environment so their individuals were recorded almost on protected areas only. This fact confirms that protection of these areas is essential.

**Figure 8: Flowering Spring Pheasant's eye**

Analysing the number of records on the different species by taxon groups shows that animals – first of all mammals – are on the first row because they are so popular and easy to meet them. We had many records on insects especially on the most prominent and spectacular Stag-Beetle and on the extraordinary European Mantis. Two butterfly species are a bit odd one out, because recognising them needs more practice than others. Chance of encountered with them is relatively low because they attract less attention from a person, who has general nature-conservation knowledge. Understandably, plant species have lower rank in the ranking order of the number of observations of the different WildWatcher species because their flowering time are much shorter than the observation period of animals. Although that, we received more than 400 data from few weeks flowering Spring Pheasant's eye (Figure 8).

Naturally, yearly pattern of the observations and in parallel the uploading events show increased activity in the growing season when more WildWatcher species are observable then in winter time. Highest activity peak on observations appears in Septembers which may be caused by the improved observation activity at the back-to-school period (there are an activity peak on uploading time too) or increased activity of popular species (hedgehogs, squirrels, moles etc.). Interestingly, uploading activity shows a second peak in January. It is not obvious why people upload more data at that time when few WildWatcher animals and nearly none of the plant species (except Butcher's-broom) are observable. Volunteers may spend their resting time at the very beginning of the year to remember and sort their last year memories on good time spent in the nature and have enough time to upload their earlier observations as well. Number of registered data of spring-flowering flowers like Snowdrops definitely concentrated around the flowering period which shows the data reliability.

In spite of the fact that about half of the WildWatcher's data originated from residential area the records on Spring Pheasant's eye were mostly provided from rural areas. This ratio point to the fact that the plants occur mostly out of the residential area, and it is rare to send data from their garden or a rural park. It is also an important lesson that the volunteers sometimes cannot identify properly the status of the area. Supervised and verified data of some species like Greater Pasque Flower or European Ground Squirrel can contribute to comply international reporting obligation, improving our knowledge of their potential occurrence (Váczi et al. 2012). Additionally to the compulsory and facultative fields on data sheets of the species the volunteers send us stories about their observations, which provide us new approaches and new questions on the species behaviour and their occurrence. There are good example for stories about Stag-Beetle, which provide data like which trees were they

prefer, or a lot of Hedgehog eat cat or dog food in the city area. Other descriptions suggest an idea that Hedgehog can occur outside of their distribution area or in higher densities where normally food-limitation would be presented. Analysis of the fulfilled optional field on data sheets of European Ground Squirrel about the field-management of their habitat supports the importance of the management of the vegetation on the habitat of the Ground Squirrels (Kis *et al.* 1998), which means that mowing is much better than non-managing but grazing is the best solution for the species (Figure 9). We know from new results of genetic research that there are three partially isolated group of populations are exist in the case of the European Ground Squirrel (Németh et al. 2018.). Important result we had from the records of volunteers on the ratio of the number populations depend on the tree different cohorts. While cohorts of Transdanubium and Duna-Tisza Interfluve contain nearly the same number of registered populations, Transtisza region has very few populations of Ground Squirrel populations on it. It indicates that be-

**Figure 9: A European Ground Squirrel on a grazed pasture**

**Figure 10: The most sensitive generation to miracles of nature**

cause of quantitative limitations Ground Squirrel variants at Transtisza is the most endangered one. In the case of Hedgehog a compulsory field of data sheets shows the status of the species (dead or alive), and this data can be used to identify which routes can be particularly dangerous for this animal.

After taking into account the experiences of the first 10 years of WildWatcher, the development of the programme moves forward, like developing the website in order to easier data upload, developing the existing mobile application to send data immediately, to provide more information of the species, involving volunteers by interactive quiz, building community by collective nature watching etc.

Based on our experiences we support the opinion of Bonney et al. (2015) that there are "*limited but growing evidence that citizen science projects achieve participant gains in knowledge about science knowledge and process, increase public awareness of the diversity of scientific research, and provide deeper meaning to participants' hobbies."* All over this, *"citizen science can contribute positively to social well-being by influencing the questions that are being addressed and by giving people a voice in local environmental decision making"* (Figure 10).

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# THE GARDEN-PLOT PROGRAMME

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## ABSTRACT

In real estate records, there is the category of garden-plots beside lands within and outside municipality boundaries. Therefore "garden-plot" is a classification used even today but this distinction is known only to the real estate registry, it is also used colloquially but legally, these lands are deemed to be lands outside municipality boundaries. This is exactly the reason why garden-plot is not an unambiguously defined concept.
Originally, garden-plots were intended to have a function of agricultural production where families would have been able to produce food necessary for themselves at the outskirts of the municipalities. Garden-plots were the place for self-sufficiency and supplementary income-generation but lately, garden-plots undergone a great deal of differentiation, their original function has been transformed. Changes of land use in the last decades have been influenced mainly by external, social, economical factors. In many cases, small parcels belong to a lot of owners (due to inheritance, compensation after the regime change for socialist collectivisation) and they are typically not cultivated. The unmanageable land situation is the biggest obstacle of re-cultivating these areas.

**Keywords: garden-plot , land use, urban planning**

## INTRODUCTION

Garden-plot plantations, orchards, vineyards and adjacent cellars in our mountainous and hilly areas have a prominent economical, traditionalist and community role for settlements beside their significance in landscape, cultural history and gene preservation. There have been designated delimited areas created by local communities for horticulture, so-called "gardenings" at the outskirts of almost every settlement. Later by the introduction of urban planning, these areas got the official denotation of garden-plots meaning lands designated for vine, fruit and vegetable cultivation, demarcated by at least a hedge that have been parceled related to the inner homesteads where families were able to produce products for self-sufficiency (Csatári, 2016).

Today there are approximately 200,000 hectares of garden-plots in Hungary that are mostly uncultivated, neglected. These are typically labour-intensive, small-parceled vineyards and orchards at the border of the municipalities that have not been included in large-scale agricultural activity in the last decades. To solve problems related to the utilization of garden-plots, the Ministry of Agriculture assessed the real state of them in the whole area of five counties in 2014. The conclusion of the assessment that can be drawn is that due to the abandonment of cultivation, garden-plots have become neglected, the complexity of ownership rights made them scattered and therefore a bit "without an owner". In order to take advantage of the potential of these areas, to revive the former garden-plot lands that have been neglected, to improve the value-preserving, income-generating ability of rural people, the Ministry of Agriculture launched the "Producer Village Programme" in 2015 for the first time as target V of the Farmstead Dvelopment Programme. The natural resources of local governments and population will increase by the programme and as a result, small settlements may get new impetus. Relaunching farming has high significance in disadvantaged regions catching up, improving the conditions for the self-sufficiency, self-care, food production of local population and the living conditions, self-evaluation of disadvantaged population.
To mitigate and improve this, the Garden-Plot Revitalisation Programme launched with pilot projects in 2015 (35/2015 (IV.30.) MoA regulation) 2016. (30/2016 (IV.29.) MoA regulation) and 2017 (20/2017 (IV. 26.) MoA regulation) and from that, the independent Garden-Plot Programme was and is under way which is a great tool for local governments to settle ownership rights by buying up land and cultivate them and to improve garden-plot farming at the settlement as well as to stimulate those who have been cultivating garden-plots by improving the infrastructural background.

## GARDEN-PLOT PROGRAMME

The main principle of garden-plot revitalisation pilot projects is to revive neglected lands that have been garden-plots by communal cultivation. By buying unused, scattered fruit parcels, the local government can get bigger,

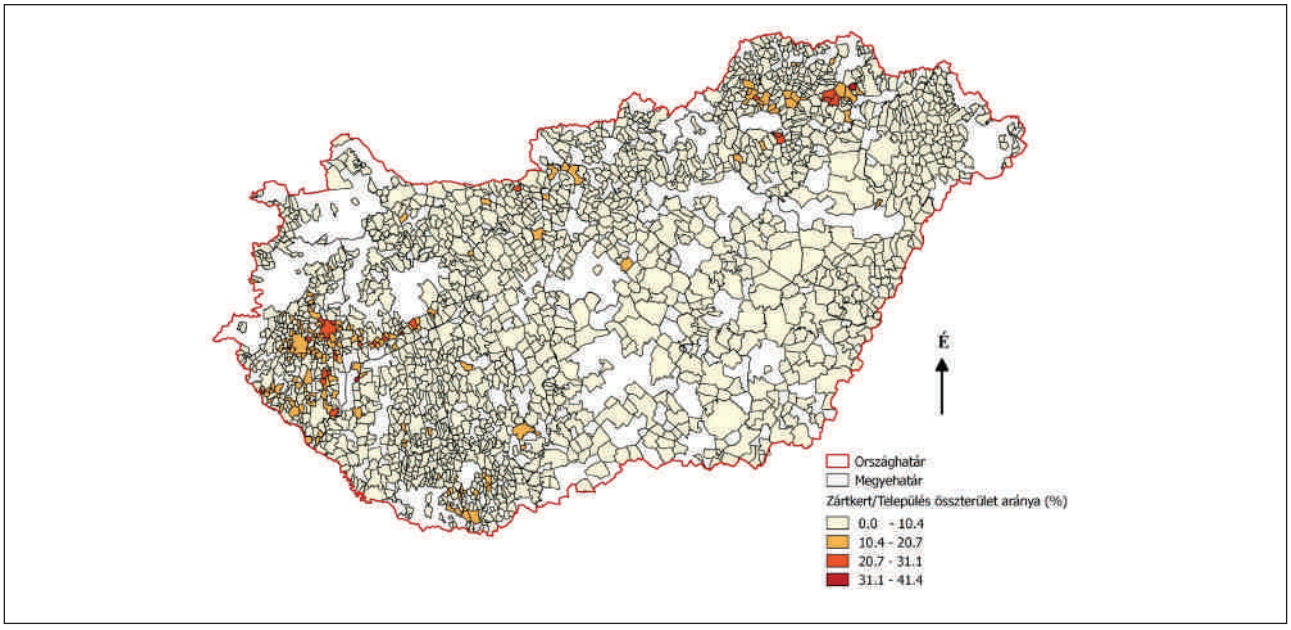


**Figure 1:The proportion of garden-plots relative to the sum of the area of municipalities (Created by: Anna Ágnes Szikora)**

continuous fruit-producing lands where it can reintroduce communal fruit production primarily by cultivating local strains that are best-accustomed to the local environment. Using the adaptability of local strains, these areas are excellent for extensive and ecological vine and fruit cultivation. In the programme, it is possible not only to revitalise neglected parcels but local governments were also able to apply for buying real estate, too.

In the programme, local governments from all over the country were able to apply for funds to implement unique pilot programmes supporting to spread social farming nationwide outside municipality boundaries. Today in Hungary, almost 2000 municipalities out of more than 3000 have garden-plots, therefore hopefully more and more will apply for funding to improve their area. In the following map (Figure 1) it can be observed that Zala, Vas and Borsod-Abaúj-Zemplén counties have the biggest proportion of garden-.plots in the area of each local government but as the figures mentioned above indicate, there are garden-plots on a big area of the country, therefore the Programme can prove to be helpful for municipalities across the nation.

In case of pilot programmes, instead of formal aspects, professional and eligibility aspects were emphasised during evaluation (e.g. how much does the municipality conform with the goals indicated in the call for application, is there an antecedent for the development, is it embedded in a well thought-out municipal development plan.) Does it take upon itself to cooperate with professional background institutions, gene preservation centres to ensure the functioning of the Programme. Funding is non-refundable, support intensity is 100%.

The results of 3 years of pilot projects:

In 2015, the ministry had nearly 188 million HUF available, enabling municipalities to implement a total of 20 projects.

In the first year, according to the ministerial regulation (35/2015 (IV.30.) MoA regulation) applications could have been handed in for the following two subprogrammes:

a) implementing poultry-rearing programme by the local government in garden-plots by establishing certificated endemic breeding stock, from which livestock is allocated to the population assisted by mentoring,

b) implementing programme to revitalize former garden-plot land for cultivation where certified endemic or local strains of plants are planted in the framework of communal farming.

The goal of the poultry subprogramme is to develop the sustainability of agricultural production in disadvantaged subregions, small villages, to improve the conditions of self-sustainability, agricultural production of local population, to establish the genetic and production conditions of poultry (meat and egg) of special quality by creating ecological mixed farms as well as to preserve traditional livestock species at their natural habitat, small backyard farms.

Out of the 20 individual support applications that had arrived at the ministry, 5 were for rearing poultry, 13 to revitalize former garden-plots and 2 for both goals therefore these were able to be implemented for a total of 178.4 million HUF.

In 2016, it was the second time to implement this programme item in the framework of the Farmstead Development Programme of the ministry as target IV (30/2016 (IV.29.) MoA regulation), then with a budget of 300 million HUF. According to the call for application of 2016,

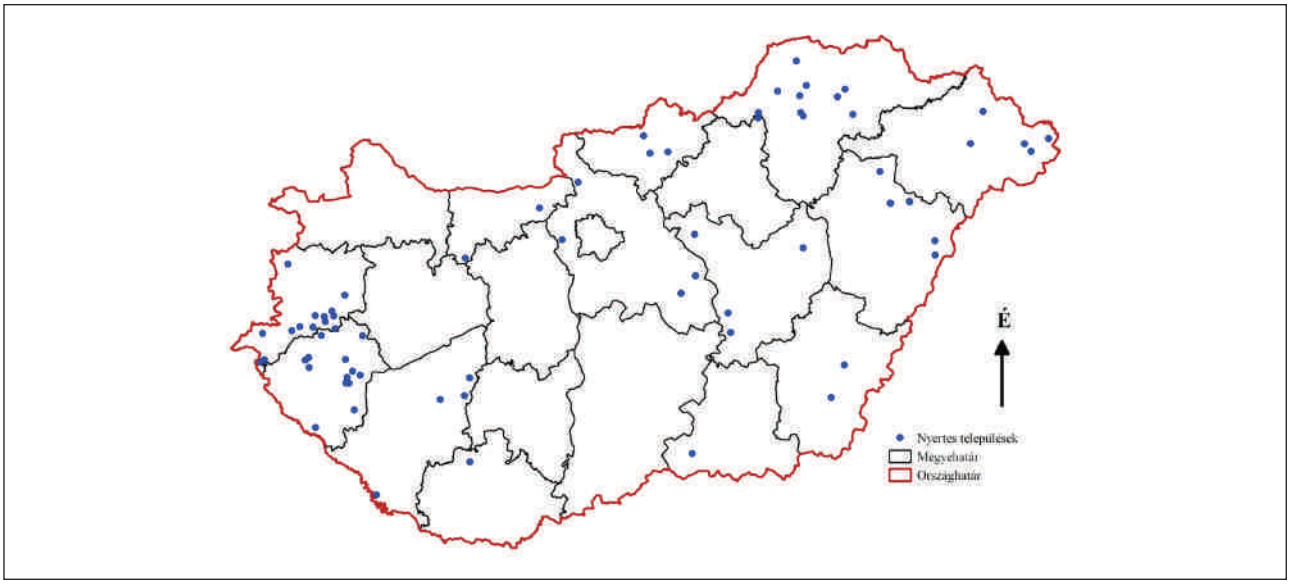


**Figure 2: The winners of the Garden-Plot Revitalization Programme in 2015, 2016 and 2017 (Created by: Anna Ágnes Szikora)**

poultry-rearing was not admissible in contrast to the previous year, therefore the programme item aiming to renew garden-plots, vineyards had more emphasis. 48 individual applications had arrived to the ministry by the stipulated deadline – also showing the heightened interest –, from which the pilot programmes of 36 municipalities were able to be implemented according to the support decision.

At the third time, the Ministry of Agriculture announced the programme aiming at revitalizing garden-plots in 2017 (20/2017 (IV. 26.) MoA regulation), for which the ministry had 300 million HUF available again. From this budget, the ministry was able to support 34 winning applications, among them some recurring municipalities that had been able to implement successful developments in previous years.

The experience of the three years shows that there is a bigger need to solve the problems of garden-plots nationwide (Figure 2), therefore in the pilot projects implemented at 50 municipalities in the framework of the Garden-Plot Revitalization Programme, 25 hectares were able to be settled in 2015 (35/2015 (IV.30.) MoA regulation), 53 ha in 2016 (30/2016 (IV.29.) MoA regulation) and nearly 50 ha according to the applications in 2017. In the last three years, the ministry assisted local governments by supporting pilot programmes aimed at reviving garden-plot lands and production with a modest sum. According to the experience gained from the implementation of these pilot programmes, it can be established that the need to re-cultivate these neglected, currently fallow lands is increasing. As a result of the last three years based on the support decisions, 90 applications were supported at 69 municipalities with more than 770 million HUF, by which almost 140 hectares of land were settled.

Many examples can be mentioned from the implementation of the pilot programmes proving that the Programme can be one of the starting points for renewing garden-plots and settlements. Public workers and local disadvantaged families were involved in many municipalities, providing new impetus for locals by utilising garden-plots again. One of the examples that can be mentioned is a highlighted development where pilot projects were implemented by the exemplary cooperation of three small settlements using the common tool inventory with planting local strains of vines and fruit trees after buyin old abandoned lands. One of the projects of a municipality from the Hungarian Great Plains should be mentioned – proving the diversity of the use of garden-plot lands – where ecological farming has been started in the project and communal farming was complemented (with the inclusion of a professional association) by programmes for processing produce. Beside the re-use of land, many local governments created community space by renovating old existing cellars or vineries to keep traditions and there were community events when graft day of village day was celebrated related to the renewed garden-plot. The ministry also welcomed ideas where the local government aimed to preserve traditional wine community lifestyle in cooperation with NGOs, associations.

In the pilot programmes, neglected lands not used previously or bought recently have been cleaned and started to be cultivated by the local governments where they were/are able to gain produce by either cultivating vegetables or planting fruit trees.

The high level of interest is shown by that the Garden-Plot Programme launched individually in 2017 was over-applied by a factor of 3.5 therefore out of the more than

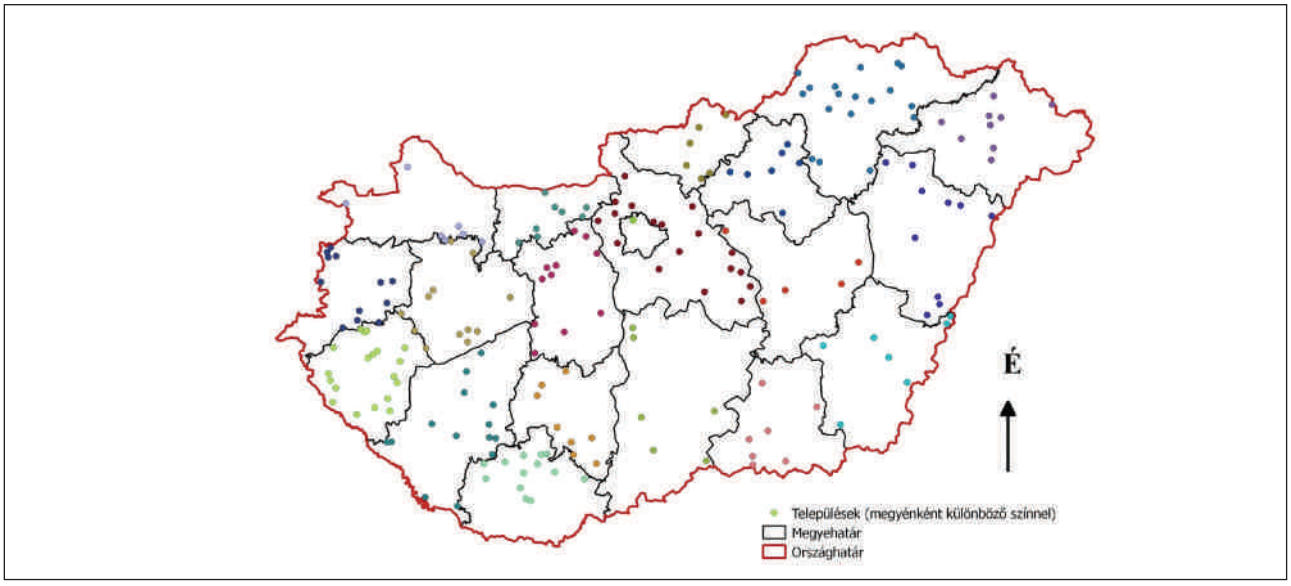


**Figure 3: The winners of the Garden-Plot Programme launched individually in 2017 (Created by: Anna Ágnes Szikora)**

700 finalised applications for more 6.8 billion HUF, the funding applications of 198 local governments (Figure 3) were supported from the 2 billion HUF budget by the Ministry of Agriculture. As it can be observed in Figure 2, the applicants are more diversified geographically across the nation, therefore a more comprehensive picture can be gained about garden-plots in the future and based on the experiences, the programme can be transformed to better suit the needs.

In the Garden-Plot Programme launched individually in 2017, the main aim was to establish the infrastructural background for agricultural use where the following goals were applicable:

1) road, dirt road to approach garden-plots, drain sewers related to them
2) establishing water supply, well
3) developments related to electricity supply
4) establishing game fence
5) landscaping, planting fruit trees and/or vines

In an application, a maximum of 10 million HUF could have been asked for in the individually launched Garden-Plot Programme. Based on the available budget, the 198 winner local governments mentioned above were able to implement their developments. Out of the goals mentioned above, most, 185 of them selected road or related drain sewer development, but 92 local governments applied for game fence while landscaping, fruit tree and/or vine planting was also very popular, applications were handed in for these goals in a total of 94 cases.

## SUMMARY

The aim of the Garden-Plot Programme launched individually is to enable the Ministry of Agriculture to assist in and contribute to settling the state of neglected garden-plot lands that occur today in Hungary and supporting the developments securing their infrastructural background. Thereby it enables strengthening the value-preserving, income-generating ability of rural residents and sustaining biodiversity as well as the landscape beside genetic preservation (by cultivating local strains accustomed to the local environment the best) and cultural goals. The goal of the ministry is beside economic results – via the local governments – to promote self-sustainability, reintroduction to the world of work, and to stimulate related local traditions, community programmes.

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