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THE IMPLEMENTATION OF AGRICULTURAL PRACTICES BENEFICIAL FOR THE CLIMATE AND THE ENVIRONMENT PROMOTED BY CAP 2014 – 2010: A CASE STUDY IN MEDIUM-SIZE ROMANIAN AGRICULTURAL HOLDING

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Abstract
The current European Union Common Agricultural Policy 2014 – 2020 places particular emphasis on the implementation of environmentally friendly agricultural technologies and the preservation of spontaneous and agricultural biodiversity. In order to promote more sustainable agricultural production, the actual Common Agricultural Policy conceived three main ecological commitments applied by farmers managing 10 or more hectares of arable land. These greening measures are crop diversification, maintaining permanent grassland and declared "ecological focus areas". The main objective of this paper is to evaluate the implementation of agricultural practices beneficial for the climate and the environment in a medium-size Romanian agricultural holding. The case study was carried out in a private medium – size farm with the main activity represented by cereals crops from Olt county located in southern Romania. In order to be more environmental – friendly and to access the European funds for agriculture, farmer applied for greening direct payment in period 2016 – 2018. The culture scheme for crop diversification was the same, but proportion of crops was different. Ecological Focus Areas on the agricultural holding were represented by nitrogen-fixing crops (green peas culture). Application of green measures increased the farmland biodiversity, agricultural productivity and the level of farm income provided by direct payments.

Keywords: crop diversification, ecological focus area, environment, European Common Agricultural Policy, greening measures.

1. INTRODUCTION

The most recent reform of the European Union Common Agricultural Policy 2014 – 2020 (CAP 2014 – 2020), introduced new three "greening measures" to enhance the environmental performance of agricultural holdings. These greening measures include rules on maintaining permanent grassland, crop diversification and Ecological Focus Areas (EFAs). Farmers who are entitled to the single area payment scheme apply mandatory farming practices beneficial to the climate and the environment on all their eligible hectares.

The main components of the Romanian CAP 2014 – 2020 that are connected to environmental protection are:

- agri-environment-climate measures within the national rural development program (a key element for the integration of environmental concerns into the Common Agricultural Policy);

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- good agricultural and environmental conditions, abbreviated as GAEC, refers to a set of European Union (EU) standards (described in Annex III of Council Regulation 73/2009) defined at national or regional level, aiming at a sustainable agriculture;
- agricultural practices beneficial for the climate and the environment – greening measures ("greening direct payments", compensations that represent about 30% of the direct agricultural subsidies).

Several studies have been reported the European Common Agricultural Policy impact for agricultural holdings, environment and agricultural landscape (Alons, 2017; Popescu 2017; Popescu and Popescu, 2017a; Popescu and Popescu, 2017b; Popescu and Popescu, 2018; Birkhofer et al., 2018).

Common Agricultural Policy introduced compulsory greening measures for farmers eligible to access direct payments with the goal to mitigate environmental degradation mainly caused by intensive agriculture (Sahrbacher et al., 2017). Green direct payments have been conceived as a tool to encourage European farms towards the adoption of environmentally friendly practices (Diotallevi et al., 2015).

Agricultural intensification affects farmland biodiversity and agricultural ecosystem functions and services. Pe'Er et al. (2017) assessed the potential benefits of EFAs options for biodiversity and found that ecologists scored field margins, buffer strips, fallow land, and landscape features as most greening measures beneficial for the environment and the climate. However, farmers have implemented the following EFAs in the largest proportion: nitrogen-fixing crops, catch crops, and fallow land.

The report from the European Commission to the European Parliament and the Council from 2017 on the implementation of the EFAs obligation under the green direct payment scheme, mentioned that in 2015, 70 % of the EU27 total arable land fell under the ecological focus areas rules, while in 2016 the proportion was 68%. The report also shows that farmers declared ecological focus areas larger than they were bound. Nitrogen-fixing crops are most frequently declared EFA types in Romania. Generally, farmers have opted for those ecological focus areas that are linked to productive or potentially productive agricultural areas.

Ciliberti and Frascarelli (2018) report that the Common Agricultural Policy of European Union is an important source of income for farmers, mainly provided by accessing direct payment schemes.

One of the new greening instruments of the CAP 2014 – 2020 is the crop diversification measure defined by a minimum number of crops on their land, in given proportions (Mahy et al., 2015). Cortignani at al. (2017) reported that greening practices promoted by CAP 2014 – 2020 have positive effects on environmental goals and the system for reducing green payments and levying administrative penalties in case of non-compliance is effective and ensures compliance with practices in almost all Italian specialized arable farms. Also, Cortignani and Dono (2019) mentioned that new greening rules obtained positive environmental impacts with very limited income reductions. The most constraining component of the diversification measure appears to be requirement of main crop that cannot cover more than 75% of the arable land in farms with an arable area greater than 10 ha. Small farms are only slightly impacted by crop diversification because they are exempted from the measure, while large farms are less affected because they usually have more possibilities for diversified production structures (Louhichi et al., 2017). The authors suggest that the effect of crop diversification on farm income is rather limited at the aggregate level.

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The main objective of this paper is to evaluate the implementation of agricultural practices beneficial for the climate and the environment promote by cap 2014 – 2010 in a medium-size Romanian agricultural holding.

2. MATERIALS AND METHODS

The case study was carried out in a private farm in the Olt county located in southern Romania. The main activity of the farm is "Cultivation of cereals (excluding rice), leguminous plants and plants producing oilseeds". According to Romanian legislation (Law no. 37/2015 concerning the classification of farms and agricultural holdings) the farm where was applied the greening measures promote by the CAP 2014 – 2020 is a medium – size farm. In order to be more environment – friendly and to access the European funds for agriculture, farmer applied for greening direct payment promote by the CAP 2014 – 2020 in period 2015 – 2018. Green direct payments are payment for agricultural practices beneficial for the climate and the environment.
Greening measures designed to improve sustainability applied in the farm involved two instruments:

- crop diversification (requirement for farm with over 30 ha of arable land)
- Ecological Focus Areas (requirement for farm with over 15 ha of arable land: at least 5% EFAs).

In order to meet the requirement of crop diversification, the following species were cultivated: wheat (*Triticum aestivum* L.), rape (*Brassica napus* L.), sunflower (*Helianthus Annuus* L.), maize (*Zea Mays* L.), barley (*Hordeum vulgare* L.), green peas (*Pisum sativum* L.). Ecological Focus Areas on the agricultural holding were represented by green peas culture (nitrogen-fixing crops).

The main requirements for agricultural practices beneficial for the climate and the environment are presented in table 1.

Table 1. Requirement for Crop Diversification and Ecological Focus Areas (EFAs) to access greening payments for agricultural practices beneficial for the climate and the environment

1. Requirement applies to farmers with over 10 ha of arable land	**Number of different crops for diversification**	**Maximum proportion of main crops in arable land**
Farms with 10 – 30 ha arable land	at least 2 crops	main crop cannot cover more than 75% of the land
Farms over 30 ha of arable land	at least 3 crops	main crop covering at most 75% of the land and the 2 main crops at most 95%
2. Requirement applies to farmers with over 15 ha of arable land	**Ecological Focus Areas**	
Farms with arable areas exceeding 15 ha	at least 5% EFAs	
Farms with less than 15 ha	"It is recommended to declare areas of ecological interest (ZIE)"	

Ecological Focus Areas comprising a combination of management practices or landscape features as set out in the Regulation (EU) No 1307/2013 and applied by Member States. Farmers exploiting arable land less than 15 hectares must declare ZIE (terraces, buffer zones and landscape elements) located on the holding's land. For nitrogen fixation crops that are declared Ecological Focus Areas, it is forbidden to use plant protection products. There are several EFAs options that can be used on their own or in combination to meet the EFAs requirement: fallow land, field margins, catch crops, green cover, nitrogen-fixing crops, hedges and trees, agro-forestry. Farms that are fully occupied by permanent crops, small farmer's scheme participants, as well as farms where the area is entirely

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covered by organic farming or apply agri-environmental-climate packages are exempted from the requirements for diversification of crops or the presence of ecological interest areas. Under these circumstances, farmers are exempt from greening rules and automatically receive their greening payment for their holding.

3. RESULTS AND DISCUSSIONS

Crop diversification in the agricultural holding is the growing of a number of different crops. It enhances agricultural and landscape biodiversity and may improve soil organic matter by: reducing soil erosion, pest and weed control, improving water quality, reducing the effects of climate change. In order to adopt and maintain farming practices that help meet environment and climate goal promote by the actual European Common Agricultural Policy, covering the period 2014–2020, for crop diversification environmental requirement in 2016 were growing six crops on farm with a total 150 ha arable land (figure 1). The main crop was represented by wheat (40 %) and the two main crops were wheat and rape (60 %). In 2017, there are six crops for the purposes of crop diversification, the main crop is wheat (50 ha = 33,33%) and it is not more than 75 percent of the arable area and the two main crops together (wheat + rape, 80 ha = 53,33%) are not more than 95 percent of the arable land (figure 2).

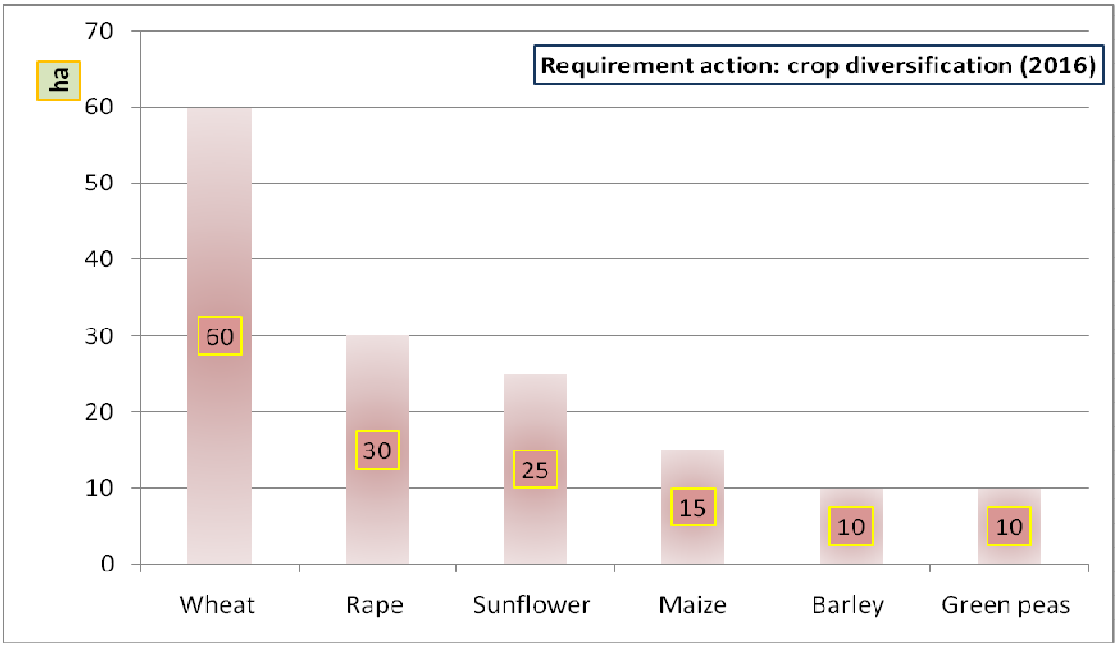

Figure 1. Greening measures: crop diversification - farm with over 30 ha of arable land (2016)

In 2018, the farmer meets the requirement of diversifying crops with the following crops: 70 ha wheat (*Triticum aestivum* L.), 30 ha sunflower (*Helianthus Annuus* L.), 25 ha rape (*Brassica napus* L.), 15 ha maize (*Zea Mays* L.), 15 ha barley (*Hordeum vulgare* L.) and 15 ha green peas (*Pisum sativum* L.) (figure 3). The main crop (wheat) covered at most 41, 17% of the land and the 2 main crops (wheat and sunflower) covered at most 58, 82% of the arable land.

Ecological Focus Areas (EFAs) are one of the three new greening measures of the European Common Agricultural Policy (CAP), with the aim of enhancing the ecological function of agricultural landscapes and to improve the biodiversity. Ecological Focus Areas on the agricultural holding were represented by green peas culture (nitrogen-fixing crops). Farm meets its Ecological

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Focus Areas requirement by having at least five hectares of nitrogen – fixed crops (figure 4). The structure of Ecological Focus Areas in farm during 2016 – 2018 periods was: 6, 66 % EFAs in 2016, 10 % EFAs in 2017 and 8, 82 % EFAs in 2018. The amount of green direct payment in Romania varied from 59, 12 euro in 2015 to 58, 23 euro in 2018 (figure 5). Regarding the farm income earned for green measures or agricultural practices beneficial for the climate and the environment, green direct payments account 8506 euro in 2016, 8.575 euro in 2017 and 9.899 euro in 2018 (figure 6).

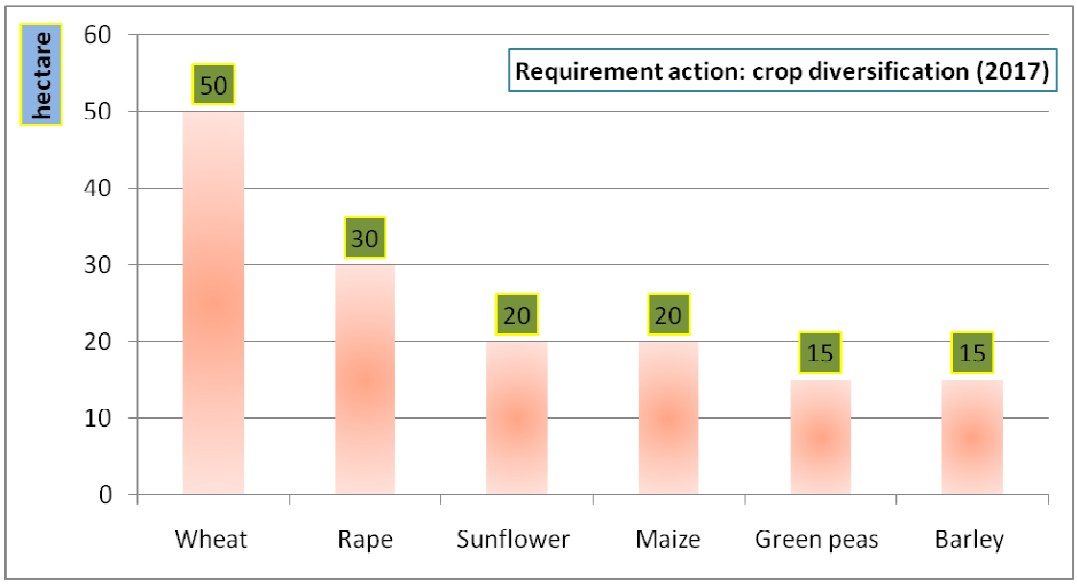

Figure 2. Greening measures: crop diversification - farm with over 30 ha of arable land (2017)

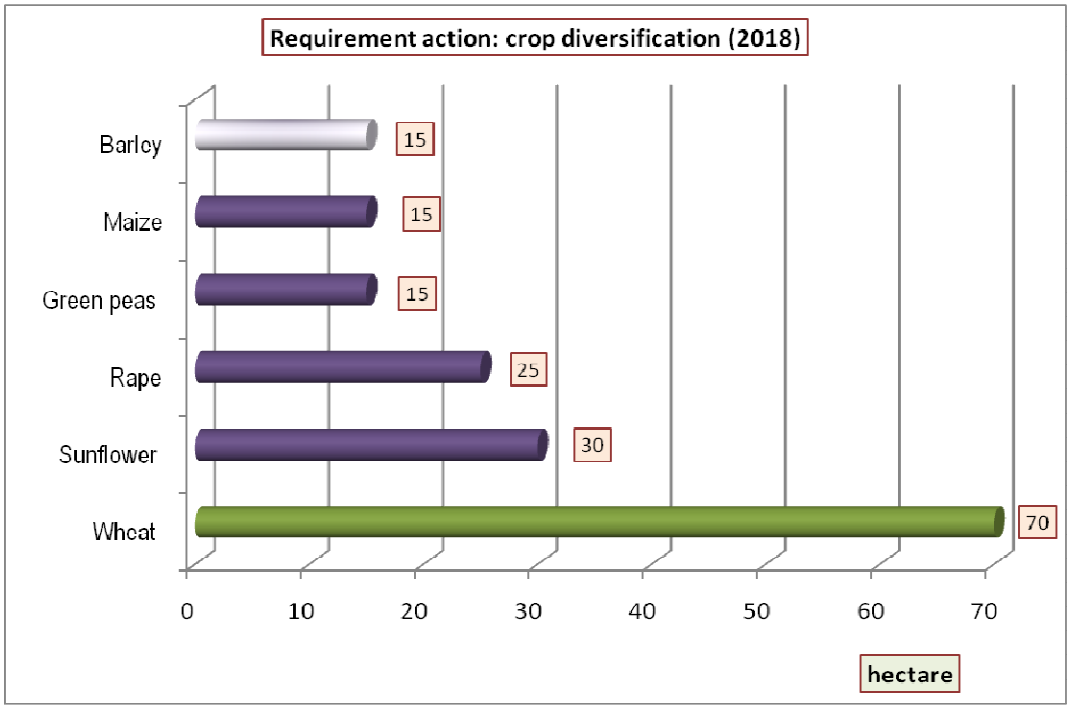

Figure 3. Greening measures: crop diversification - farm with over 30 ha of arable land (2018)

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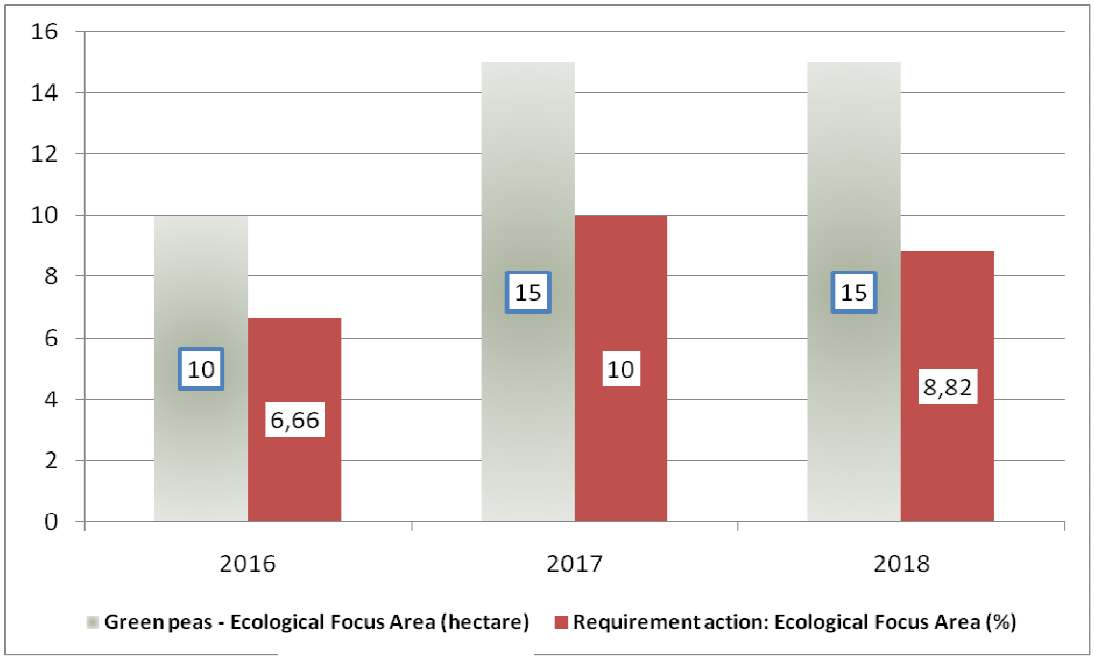

Figure 4. Greening measures: Ecological focus areas - farm with over 15 ha of arable land (at least 5% EFAs)

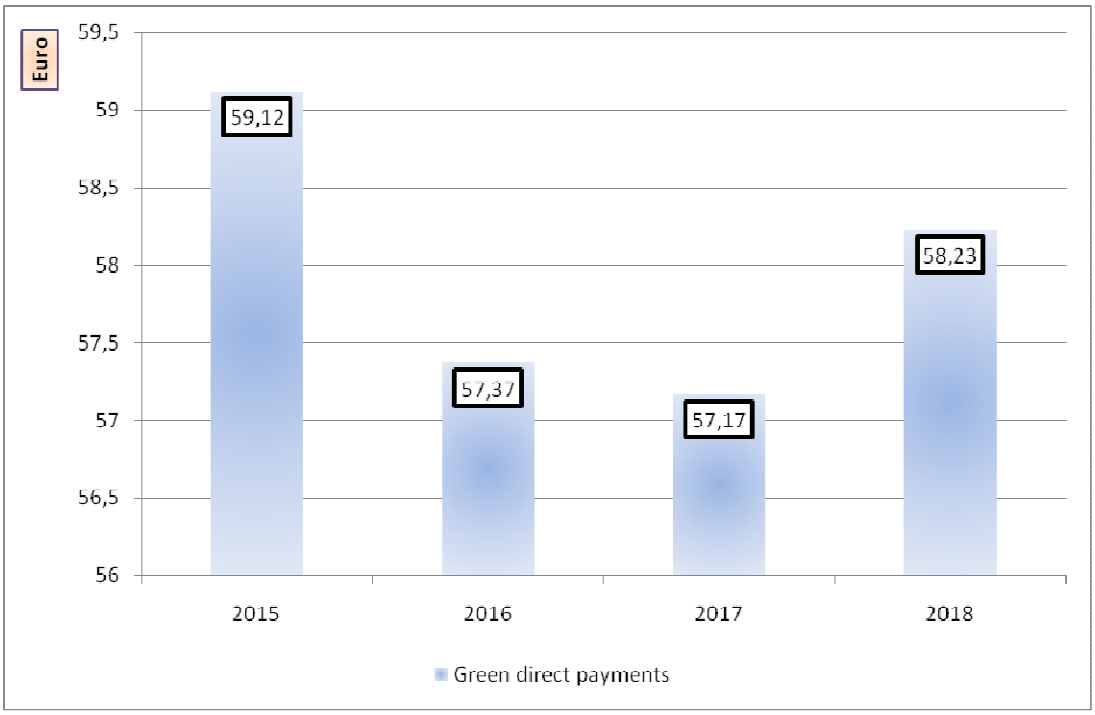

Figure 5. Level of green direct payment, Romania (Euro)

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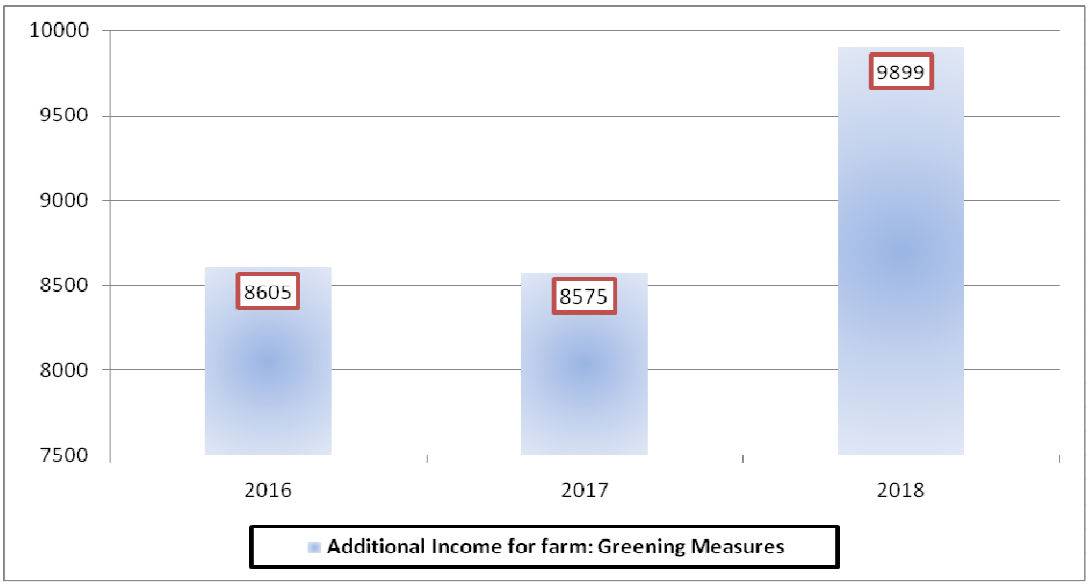

Figure 6. Additional Income for farm: Greening Measures (Euro)

4. CONCLUSIONS

In terms of crop diversification, the company has complied with the requirements of the European Union and has managed to respect each year by cultivating 6 types of cereals: common wheat, rape, sunflower, corn, barley and peas. It can be seen that each year, the minimum percentage required to meet the ecological commitments through the presence of ecological interest areas in holdings with more than 15 hectares of arable land has been exceeded. The implementation of good agricultural and environmental farming practices within the agricultural holding has brought economic and environmental benefits. Apart from the fact that higher agricultural subsidies have been collected, agricultural productivity has also increased.

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