

## ACHIEVING ENVIRONMENTAL PROTECTION THROUGH IMPLEMENTATION OF AGRO-ENVIRONMENTAL PRACTICES FROM AGRICULTURAL HOLDINGS

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### **Abstract**

*Agro-environmental practices lead to protection, maintenance and improvement the ecological quality of environment and limitation the negative impact on natural resources. Their implementation may be voluntary because of the participation in commitments with European and national funding programs or because of the implementation of national standards for good agricultural practices. The aim of the article is to analyze the role of agro-environmental practices for achieving environmental protection and make conclusions for the possibility of agricultural holdings to implement agro-environmental practices. The results in this paper are based on structured interview. Two surveys were conducted as follows: the first one is expert survey and the second one is survey among agricultural producers. The main results are related to the most important practices for environmental protection. The allocation of funds for support and diversification of activities, maximum use of resources obtained in each farm and the introduction of new technologies would lead to the implementation of agro-environmental practices and environmental protection.*

**Key words:** agro-environmental practices, environment, agroecology

### **INTRODUCTION**

Agroecology includes different approaches to solve a number of problems of agricultural production. Initially, the object of the theoretical study was mainly the aspects of production in terms of plant protection, but later scientist focused on various environmental, social, economic and ethical issues. Agro-environmental practices lead to protection, maintenance and improvement of the ecological quality of agricultural land and limitation of the negative impact on natural resources. Their implementation may be a voluntary consequence of commitments made due to participation in European and national funding programs or implementation in order to be followed the national standards for good agricultural practice. Agro-environmental practices cope specific problems, objectives and spatial scales depending on the current state of the agricultural, natural and cultural environment. Deterioration of water quality, soil pollution, air pollution and damage of landscape elements are major problems. Understanding what encourages farmers to

implement agro-environmental practices is crucial for intensifying the process and to solve some of these environmental problems.

Agro-environmental practices are defined as a process of perception, not only in terms of the applicability of environmental standards in agriculture, but also as the internal perception and motivation of farmers [10].

Some authors [6] consider that agro-environmental practices combine both traditional agricultural methods with modern technologies in order to protect the environment.

Agro-environmental practices are used to increase agricultural production through ecological processes and ecosystem services as nutrient cycling, biological nitrogen fixation, soil, water and biodiversity conservation. They avoid the use of conventional methods such as chemical fertilization, synthetic pesticides and GMOs [9]. The implementation of agro-environmental practices contributes to improvement the resilience of agro-ecosystems.

Agro-environmental practices are also implemented in small farms, thus limiting farmers' vulnerability to climate change, resource degradation and volatile agricultural prices [7]. They are defined as the only possibility for some farms to produce products in order to obtain economic benefits while protecting the environment.

Some authors [1] consider agro-environmental practices as a rule, that should minimize the use of energy and resources by recycling or using resources close to the farm.

Practices such as reducing the need for water, pesticides and fertilizers, replacing chemicals with natural pesticides lead to increase in crop efficiency and productivity.

Agro-environmental practices with the highest implementation in modern agriculture are separate fertilization and use of different varieties in crop production [9].

According to some authors [3], practices such as drip irrigation management and the selection of appropriate varieties and crops have a high level of implementation and will continue to be improved and applied to a greater extent over the next decade.

Soil quality is defined as one of the key indicators for environmental protection. The implementation of practices such as minimal tillage, organic fertilization and reduced use of pesticides lead to improved statement, quality and fertility of the soil. According to some researchers [2] these agro-environmental practices, have a medium to high level of implementation. Their implementation will increase because of the actual requirements for environmental protection and growing environmental problems connected with tillage.

The implementation of practices such as different crop rotations lead to an increase in the biological activity of the soil, reduce the use of pesticides and increase the possibility of biological pest control.

Different authors [4] also consider that there is a connection between the implementation of agro-environmental practices and air quality protection. They consider that the implementation of voluntary mechanisms for the implementation of agro-environmental practices will lead to an intensification of the

process and protection of the environment. In another study [8], they share the view that farmers' attitudes towards agro-environmental practices will reduce the negative impact of agriculture on both water resources and the environment.

Diversification has a significant role for the implementation of agro-environmental practices and these practices are related to growing new plant varieties, increasing the use of agroforestry in order to increase the resilience of agro - ecosystems, protecting the environment and biodiversity.

Focusing on the attitude of farmers towards environmental protection, the authors [5] classify four types of farmers as follows:

(1)active participants who apply voluntary practices, both with regard to the protection of the environment and because of the financial reasons;

(2)passive farmers who implement agro-environmental practices mainly from a financial point of view;

(3)conditionally non-accepting farmers who would participate in certain circumstances (for example, easier to adapt measures and higher payments);

(4)non-accepting agricultural producers.

Based on the literary review the conclusion is that there is a wide variety of practices related to the environmental protection. The theoretical review shows that the practices connected with the soil, air, water and landscape protection are the most common. The aim of the article is to analyse the role of agro-environmental practices for achieving environmental protection and make conclusions for the possibility of agricultural holdings to implement agro-environmental practices.

The paper structure includes: 1) Introduction, that contains theoretical views on the role of agro-environmental practices for environmental protection 2) Methodology 3) Analysis of the role of agro-environmental practices for environmental protection 4) General conclusions about the role of agro-environmental for environmental protection.

## MATERIALS AND METHODS

Two field surveys were conducted in this research as follows: the first one is expert survey and the second one is survey among agricultural producers.

22 structural interviews were conducted in July 2020. The respondents were experts in the field of agroecology and agro-environmental practices. For the successful conduction of the survey the questionnaire was sent to three groups of respondents: 1) experts from the National Agricultural Advisory Service (NAAS); 2) experts from institutes (Institute for Economic Research at Bulgarian academy of science (BAS) and Institute of Agrarian Economics at BAS); 3) Experts from universities.

Figure 1 presents the distribution of experts who participated in the expert survey. Respondents who work in the universities (45%) have the highest share from all the experts, followed by the experts working in various institutes - 33%. The consultants in the municipal agricultural services and in the NAAS have the smallest relative share - 22%.

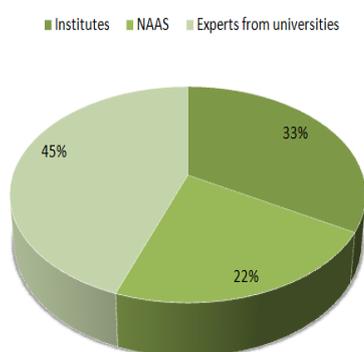


Fig. 1. Distribution of the experts according their workplace  
Source: own survey.

The survey among farmers was conducted in September 2020. 61 structured interviews with farmers were organized. The managers of agricultural holdings participating in the survey are mainly men (71.7%). In the sample of women, farm managers are 23%. The average age of the respondents is 28.53 years. The largest is the relative share of the respondents under the age of 35 years - 33%. Only 5% of respondents fall into the 66-year-

old category. The group of respondents between 36 - 45 years and 46 - 55 years covers respectively 23% of the respondents. The agricultural experience of the surveyed farmers varies from 2 to 35 years, with an average score - 6.83 years for all the respondents. The largest group of respondents has been engaged in agriculture for less than 10 years, while the smallest number of respondents have more than 30 years agricultural experience.

For the purposes of the article are used questions from the farmer's questionnaire aimed at assessing the impact of agro-environmental practices on environment. Some of the practices are separate fertilization, organic fertilization, spatial distribution of crops, use of organic substances such as compost, selection of suitable variety, replacement of chemical with natural pesticides, use of roof crops to protect soil and water etc. This question is assessed on a five-point Likert scale. Farmers also assess what are the main reasons for them to implement agro-environmental practices, and the question has the possibility of more than one answer. The used questions from the expert survey are related to assess the possibilities of agro-environmental practices for environmental protection and also their effect on natural resources. These questions were also assessed using a five-point Likert scale.

## RESULTS AND DISCUSSIONS

### Results and discussion based on the expert survey

The relationship between the implementation of agro-environmental practices in agricultural holdings and environmental protection and in particular water, soil, biodiversity is proportional (Figure 2).

Respondents assess the role of the implementation of agro-environmental practices for environmental protection. The prevailing opinion of the respondents is that agro-environmental practices has the strongest impact on the protection of biological diversity and protection of land resources (50%).

The second most important benefit for the environmental protection from implementing agro-environmental practices is protection of water resources (40%), followed by the positive impact on climate change and the reduction of the risk of floods, respectively 36%.

About one third from the respondents are agree to some extent that agro-environmental practices protect the environment and in particular have a positive impact on climate change, reducing the risk of floods, biodiversity, water and land resources.

The processes of erosion, pollution, swamping, lack of species diversity, as well as the pressure on the environment and natural resources are identified as a threat that would stimulate the implementation of agro-environmental practices.

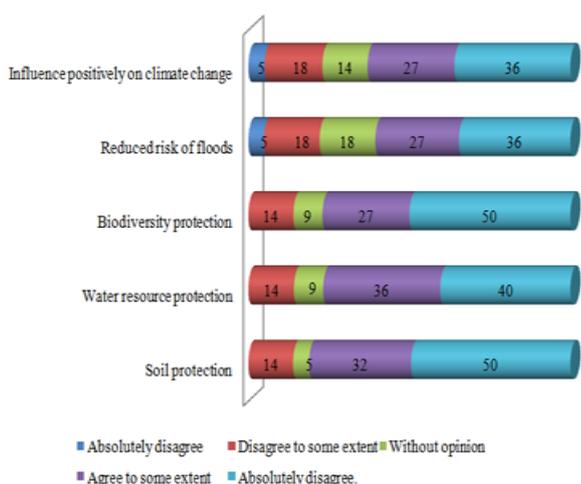


Fig. 2. Distribution of experts' opinion on the role of agro-environmental practices for the environmental protection  
 Source: own survey.

The ranked activities that can lead to environmental protection by agricultural holdings are presented in Figure 3.

Experts consider that three of the proposed activities have a significant impact and would lead to environmental protection. They are as follows:

- allocation of funds for support and expansion of activities (45%);
- maximum use of resources received in each farm (41%);
- introduction of new technologies (41%).

Most of the respondents consider that the proposed activities will partially protect the environment and the answers for the various activities vary from 41 to 54%.

Only 18% of experts are on the opinion that the use of new varieties on farms would lead to environmental protection. The skepticism may be due to the fact that most of the new varieties that come on the market are GMOs.

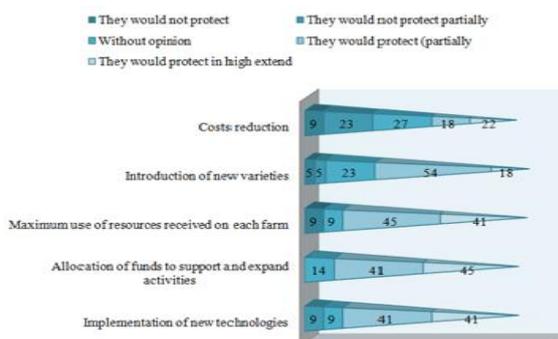


Fig. 3. Distribution of experts' opinion on activities that may lead to environmental protection  
 Source: own survey.

Experts agree that the most pronounced effect of the implementation of agro-environmental practices is to increase the maintenance and the improvement of the ecological condition of arable land (86%) (Figure 4).

It should be noted that both responses for the increasing the competitiveness of agricultural holdings and the introduction of new technologies, varieties and breeds of animals have the same effect from the implementation of agro-environmental practices, respectively 41%. The increase in the capital of agricultural holdings and the environmental protection have the smallest relative share, respectively 9% and 4%.

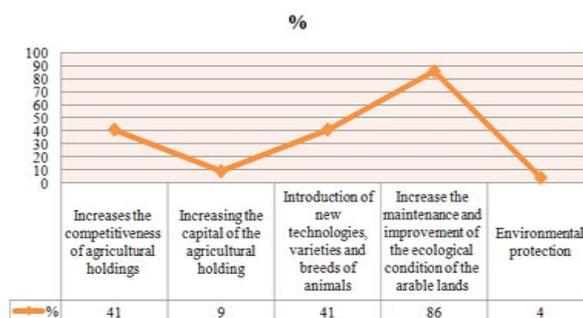


Fig. 4. Distribution of expert opinion on the effects from the implementation of agro-environmental practices  
 Source: own survey.

### Results and discussion based on the survey with agricultural producers

The opinion of farmers on the effects of the implementation of agro-environmental practices and the main reasons for their motivation for implementation of these kind of practices was studied in term to assess the possibilities of agricultural holdings for environmental protection.

Based on the data from Figure 5 we could conclude that the prevailing respondent's opinion is that the implementation of agro-environmental practices in order to protect the environment is very important.

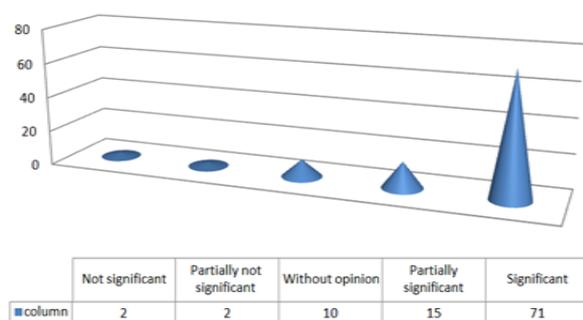


Fig. 5. Distribution of the farmer's opinion on the significance of the effects of the implementation of agro-environmental practices  
 Source: own survey.

15% of farmers partially or completely share the opinion that the implementation of environmental practices is important for the environment.

The most important reason for the implementation of agro-environmental practices is environmental protection. 60% of the respondents are partially or completely agree and they also define receiving of financial compensation as the second most important factor (Figure 6).

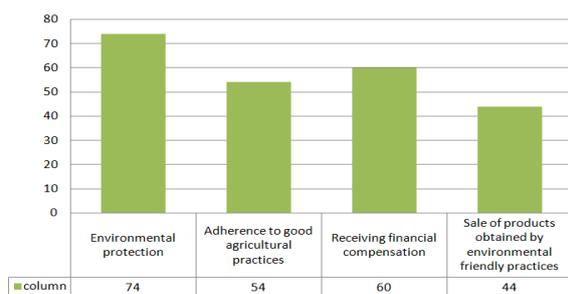


Fig. 6. Assessment of the main reasons for the implementation of agro-environmental practices  
 Source: own survey.

More than half of the farmers share that the adherence to good agricultural practices are the main reason for the implementation of agro-environmental practices. The sale of products obtained in an environmentally friendly way has the lowest relative share according to the other reasons - 44%.

### CONCLUSIONS

Based on the results from the conducted surveys and realized analyzes, the following general conclusions could be made:

-There is a wide variety of practices related to the environmental protection. The most important for environmental protection are the protection of biological diversity and protection of land resources. Soil, water and landscape protection are also defined as important in terms of receiving environmental benefits.

-The allocation of funds for support and diversification of activities, maximum use of resources obtained in each farm and the introduction of new technologies would lead to the implementation of agro-environmental practices and environmental protection.

-Age, education of managers and experience in agriculture are important factors for implementing agro-environmental practices and achieving economically efficient, environmentally friendly, socially responsible and sustainable agriculture.

-Agro-environmental practices are more important at the environmental level than at the farm level, and the implementation of agro-environmental practices from agricultural holdings would be the most common reason for environmental protection.

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## REFERENCES

- [1] Altieri, M.A., 1995, *Agroecology: The Science of Sustainable Agriculture*, Westview Press, London, p.99.
- [2] Bouma, J., Finke, P., Hoosbeek, M., Breeuwsma, A., 1998, Soil and water quality at different scales: Concepts, challenges, conclusions and recommendations. *Nutrient Cycling in Agroecosystems*. Vol. 50(1), 5-11.
- [3] Hansen, B., Fjelsted, F., Kristensen, E., 2001, Approaches to assess the environmental impact of organic farming with particular regard to Denmark. *Agriculture, Ecosystems & Environment*, Vol. 83, pp. 11-26.
- [4] Harizanova-Bartos, H., Stoyanova, Z., 2018, Impact of agriculture on air pollution, CBU International Conference Proceedings. Vol. 6, p.171. Central Bohemia University.
- [5] Morris, C., Potter, C., 1995, Recruiting the new conservationists: Farmers' adoption of agrienvironmental schemes in the U.K. *Journal of Rural Studies*, Vol 11(1), 51-63.
- [6] Reganold, J. P., Wachter, J. M., 2016, Organic agriculture in the twenty-first century. *Nature plants* 2, 15221, p.1.
- [7] Silici, L., 2014, *Agroecology - What it is and what it has to offer ? Food and agriculture*. IED Issue Paper. IED, London, p.17.
- [8] Stoyanova, Z., Harizanova-Bartos, H., 2019, Impact of agriculture on water pollution, *AGROFOR International Journal*, Vol. 4(1), p.117.
- [9] Vanwindekens, F.M., Baret, P. V., Stilmant, D., 2014, A new approach for comparing and categorizing farmers' systems of practice based on cognitive mapping and graph theory indicators. *Ecological Modelling* 274, p.1-11, <https://doi.org/10.1016/j.ecolmodel.2013.11.026>, Accessed on 10.11.2020.
- [10] Wezel, A., Casagrande, M., Celette, F., Vian jean-françois, Ferrer, A., J., 2014, *Agronomy for Sustainable. Agroecological practices for sustainable agriculture. A review*. *Agronomy for Sustainable Development*, Vol.34(1), 1-20.