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## Ecological Culture of Agricultural Producers – Case Study in Serbia and Bulgaria

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### ABSTRACT

The development of technocratic culture has caused numerous positive and negative changes in human life, and fully or partially solved the problems that the society has faced, but also created the new ones. The application of scientific and technological knowledge enabled us to produce large quantities of food, and at least partially solve one of the biggest global problems of mankind - the shortage of food. However, it turned out that chemical applications and mechanization of agricultural production have had various negative environmental consequences, and that the overuse of pesticides and fertilizers has had negative impact on human health. The first part of the paper presents the data obtained by an empirical research on some dimensions of ecological culture among the farmers in Serbia. In the second part of the paper, the data obtained in this study are compared to the data obtained in part of the same problem in Bulgaria. Based on the collected data and comparisons, it has been concluded that there is partially developed ecological culture in this specific group of producers in both countries.

Keywords: Agricultural production; Environmental awareness; Ecological culture

## Tarımsal Üreticilerde Ekolojik Kültür-Bulgaristan ve Sırbistan Örneği

### ESER BİLGİSİ

Araştırma Makalesi – Tarım ve Çevre

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### ÖZET

Teknolojik kültürün gelişmesi insan hayatında birçok olumlu ve olumsuz değişikliklere yol açtı, tamamen veya kısmen toplumun karşı karşıya kaldığı sorunlara çözüm getirdi ancak aynı zamanda yeni sorunların ortaya çıkmasına da neden oldu. Bilimsel ve teknolojik bilginin uygulanması büyük miktarlarda gıda üretmemize, en azından insanlığın küresel sorunlarından biri olan gıda sıkıntısını kısmen de olsa çözmemize yardımcı oldu. Ancak kimyasal uygulamalar ve mekanizasyon çevre üzerinde olumsuz sonuçlara da yol açtı. Tarımsal ilaçların ve gübrenin aşırı kullanımı insan sağlığını tehdit etmeye başladı. Bu araştırmanın birinci bölümünde Sırbistan çiftçileri arasındaki ekolojik kültürle ilgili deneysel veriler incelendi. İkinci bölümde elde edilen bu veriler Bulgaristan çiftçilerinin aynı verileriyle karşılaştırıldı.

Toplanan veriler ve karşılaştırmalar sonucu, kısmen de olsa araştırmaya konu olan her iki ülke çiftçilerinde ekolojik kültür bilincinin gelişmiş olduğu tespit edilmiştir.

Anahtar Kelimeler: Tarımsal üretim; Çevre duyarlılığı; Ekolojik kültür

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## 1. Introduction

By the mid-twentieth century, production in rural areas was based on local resources and there was no significant ecological imbalance, or there were no local characteristics. Rural societies, in that period, knew how to harmonize their activities with the laws of nature. “However, there were too many people, but too little soil (Jovanović 1930), and in order to solve the problem of food shortage and thanks to the development of science, people began to use the pesticides and chemical fertilizers with the aim to increase yields per hectare. Without further analysis of the causes of food shortages, we notice that the “green revolution” in the 70s, apart from cultivars, increased the use of fertilizers and chemicals to fight pests. However, it turned out that the excessive and improper use of chemicals is a “double-edged sword”, which leads to incalculable negative consequences in the environment, poses great danger to humans, both for producers and consumers, and have negative economic consequences for small producers (Lappé et al 2005; Hardeman & Jochemsen 2012).

The dangers of excessive use of pesticides and unsustainable modes of production in the mid 20<sup>th</sup> century were firstly indicated by R. Carson, and then by numerous scientists and experts. It was necessary to access and review the earlier concept of development that was based on the Keynesian principles, anthropocentrism and industrial (technocratic) culture. A new model of development has been defined - sustainable development - promoted at the UN Conference in Rio de Janeiro (1992). Sustainable development, as an integral social development, is based on intra and intergeneration responsibility (Di Castri 1995; Hawkes 2001; Nurse 2006; Osborne et al 2007). Such insisting on responsibility towards

present and future generations requires changes in the culture and the value system it relies upon. The shift in culture is possible if the values of industrial and technocratic culture and profit-oriented values change (material values, anthropocentrism, all-mighty technique, etc.), and the dominant place will be given to the respect for life, responsibility and thrift (Naess 1991). Ecological awareness of a culture should contribute to the harmonization of the whole human activity with the laws of nature, and therefore, harmonization with the agricultural sector (Miltojević 2006; Sanford 2011; UN 1992; UNEP 2011).

Reviewing the literature we found that the previously studied that dealt with specific aspects of ecological culture, perception of environmental problems, the impact of agricultural production on the environment, attitudes towards organic and conventional production, etc. (Anderson, Locker & Nugent 2002; Bipasha & Chatterjee 2010; Karami & Mansoorbadi 2008; Munasib & Jordan 2006; Sarker & Itohara 2008). The aim of this study is to establish the level of ecological culture development among the Jablanica (Serbia) region farmers as one of the essential elements of sustainable development realization and comparing the results with a similar study in Bulgaria.

## 2. Material and Methods

### 2.1. Brief comments on the place, time of the survey, the research instrument, sample and data processing

The present research was conducted at the Jablanica district in the southeastern part of Serbia, in the municipality of Leskovac where agriculture is the main industrial branch, especially individual agriculture. Chemical composition of the soil is generally acidic, humus content is low, and

proportion of physiologically active phosphorus and potassium is rather small. Arable soil and garden comprise 64.4% of the cropland, grazing soil comprise 15.3%, meadows 8.8%, orchards 6% and vineyards 5.5% (CLP 2005). Data collection was done in March 2010.

A survey was used to collect the data about the level of development of ecological culture of farmers. A questionnaire, as a research instrument, was designed by the researchers from the Institute of Sociology, Bulgarian Academy of Sciences, and adapted to the research conditions in Serbia. The questionnaire was customized due to different status of Serbia and Bulgaria in the European Union. The customized questionnaire contained 41 questions.

According to the 2002 Census out of the whole population of Leskovac (156252), 22242 (14.2%) are engaged in agriculture. Out of that number, 15.9% are in farming exclusively. 60.3% of agricultural populations were individual farmers. In percentage, the number of men (50.5%) and women (49.5%) is approximately equal. As regards the level of the formal education, 4793 (44.3%) have not complete elementary school, 2235 (20.7%) have elementary education, 1954 (18.1%) high school education, 38 (0.4%) basic professional and 20 (0.2%) higher education. The age of 4.6% farmers falls between 15 and 19 years, 21% between 20 and 34, 28.9% between 35 and 54, and 31.9% over 55 years. The Leskovac municipality comprises 3149 farms. (SORS 2003; 2004; 2005). Examination in a random sample included 330 family farms (10.5%), respondents. The study included 208 males respondents (63%) and 122 females respondents (37%).

The sample gender structure does not completely correspond to the region's population because the survey included only men who are traditionally the family farms' masters. The average respondents' age was 43 years. The sample included respondents with different degrees of education, namely: without elementary education - 9 subjects (2.7%), for grades of elementary school - 16 subjects (4.8%), elementary education - 65 subjects (19.7%), secondary school education - 133 subjects (40.3%), secondary vocational education - 32 subjects (9.7%), college

education- 63 subjects (19.1%), and university education - 63 subjects (3.6%). According to the data obtained from the survey, the highest percentage of respondents (48.8%) own non-specialized farms and specialized mixed crop-animal farms (25.2%). Other types of farms (specialized for field or vegetable crops, mixed crop or livestock production) represented a small percentage of 1.5% to 4.5%.

The obtained data were processed in the SPSS system 16.0. Data are presented over the frequency, percents, Pearson correlations and Pearson Chi square. Effects are considered significant in all statistical calculations if the  $p$  values are  $\leq 0.05$ .

## 2.2. Hypothesis

The general hypothesis: The individual farmers have developed environmental culture. Specific hypotheses: H01: Agricultural production (particularly the use of chemical fertilizers and chemical substances) does not endanger the environment. H02: Soil is not a dominant value in the farmers' value system. H03: The future soil quality preservation does not depend on the farmers' value system. H04: The experts' help is not decisive in the use of chemical fertilizers and chemical substances for the plant production and agro technical deadline observation. H05: The waste disposal method, ecological acceptance and the realization ecological practice significance are not dependent of the place of soil in their value system. H06: The level of information of ecological production does not depend on the information method. H07: The information method does not influence ecological behavior. H08: The level of education does not influence the level of ecological culture development. H09: Age does not influence the level of ecological culture development.

## 3. Results and Discussion

### 3.1. Ecological culture of farmers in Serbia

The following answers to the issues have been taken into account in assessing the hypothesis: the answers to the questions on the attitudes and beliefs about the relationship between agriculture and environmental

dangers, a place of the soil in the value system, application of agro technical measures, information on agricultural policy in our country and in the European Union.

The question - *Does agriculture, according to you, threaten the environment?* - was answered in a following manner: 49.1% of the respondents answered negatively, while 38.8% answered affirmatively (11.8% of the those who answered affirmatively think agricultural activity threatens the environment to a great extent, while 27% think it does not). At the same time, 12.1% of the respondents were not able to evaluate the relationship between agricultural activities and environmental impact. Despite the fact that almost half of the respondents answered that agricultural production did not harm the environment, the majority believed that the use of chemicals in crop production threatens the environment. To the question: *What do you think is the most harmful to the environment?*, 65.5% of the respondents think that those are the anti-pest preparations used in crop production, while 15.8% of the respondents think that those are the fertilizers (Table 1).

Very small numbers of respondents – or 4.6% - opine that there is nothing harmful. The

obtained value of the  $\chi^2$  test (Table 2) show that the acceptability of the hypothesis that the conception of agricultural production and its influence on the environment does not influence their attitudes about the negative effects of agricultural chemization on natural environment. Since 49.1% of the respondents believe that agricultural production does not threaten the environment; however, 72.2% claimed that preparations used in plant production and 7.4% chemical fertilizers are environmental pollutants. The correlation coefficient shows that there is a high correlation between the realization of the relationship between environmental pollution and the use of chemical fertilizers and chemical substances in crops production. For the majority of the respondents, the soil is a source of revenue (27.1%), property (23.5%), place for growing crops (22.6%), a valuable natural resource (14.9%), and a family value (11.9%). The value of  $\chi^2$  is greater than the limit values (Table 2), therefore the hypothesis that the future soil quality preservation does not depend on the farmers' value systems is accepted. Regardless of the fact that the majority of respondents think that the soil is a source of revenue (27.1%) or a property (23.5%) or a place for growing plants (22.6%), but 65.2% of the

**Table 1- What is, in agriculture, most harmful to the environment?**

*Çizelge 1- Tarımda çevreye en zararlı olan şey nedir?*

	Frequency	Percent	Valid percent	Cumulative percent
Use of chemical fertilizers	52	15.8	15.8	15.8
Pest control chemicals used in plant production	216	65.5	65.5	81.2
Waste in livestock production	27	8.2	8.2	89.4
Valid Cultivation of the same crops for several years in a row (monoculture)	12	3.6	3.6	93.0
Other	8	2.4	2.4	95.5
No environmental damage	15	4.5	4.5	100.0
Total	330	100.0	100.0	

**Table 2- The relationship between agriculture and environmental dangers**

*Çizelge 2- Tarım ve çevre tehlikeleri arasındaki ilişki*

	Pearson chi-square	Pearson correlation
Agriculture and threat to the environment+What is, in agriculture, most harmful to the environment	62.620 <sup>a</sup>	0.204**
What is soil for you?+What is more important: soil quality or annual yields?	21.865 <sup>b</sup>	0.205**

*a*, df=15, Asymp. Sig. (2-sided) = .000; *b*, df=8, Asymp. Sig. (2-sided) = .005; \*\*. Correlation is significant at the 0.01 level (2-tailed).

respondents think that it is more important to preserve the quality of the soil for the next year, than to obtain the maximum crop yield in the current year (34.8% of the respondents). The correlation coefficient shows that there is a high correlation between the awareness of the need of soil preservation irrelevant of whether it is thought of as a source income, property, family value, place for growing crops or animals or as a valuable natural resource.

In order to achieve better crop yields, the majority of the respondents use mineral fertilizers; 47.3% completely feed the soil with this fertilizer, 37% partially use mineral fertilizers, while the majority uses anti-pest chemicals in crop production. In addition, 34.7% consult a shop assistant, 28.9% consult with a specialist, 25.8% do as they were taught by their parents, 4.9% follow the advice from specialized publications about the use of chemicals,

and 1.3% of the respondents learn about the use of chemicals otherwise (Table 3).

The obtained values of  $\chi^2$  confirm the assumption that the experts' help is not decisive in the use of artificial fertilizer and chemical substances in crops production; whereas the second part of this hypothesis is rejected since value is smaller than the limit. The correlation coefficient indicates that there is some correlation between low intensity of the experts' help in the use of chemical fertilizers and chemical substances in crops productions, as well as great correlation between the experts' help and agro technical deadlines observation (Table 4). The majority of the respondents (44.2%) dispose of packaging and unnecessary chemicals in a dump, 19.7% throw them into the river or a remote place, while 11.2% keeps them at home. 24.8% of the respondents solve the problem of used chemical disposal in another way (Table 5).

**Table 3- How do you choose the type and the quantity of fertilizers and preparations?**

*Çizelge 3- Gübre ve ilaç miktarları ile çeşitlerini nasıl seçersin?*

	Frequency	Percent	Valid percent	Cumulative percent
I consult an expert	95	28.8	28.9	28.9
I do as I learned from my parents	85	25.8	25.8	54.7
I consult a shop assistant	114	34.5	34.7	89.4
I consult my neighbors, relatives and friends	16	4.8	4.9	94.2
I follow the advice from specialized publications in media	16	4.8	4.9	99.1
Other	3	.9	.9	100.0
Total	329	99.7	100.0	
Missing System	1	.3		
Total	330	100.0		

**Table 4- The experts' help and agro technical deadlines observation**

*Çizelge 4- Uzman yardımı ve tarım tekniklerinin tarihsel gözlemi*

	Pearson chi-square	Pearson correlation
Use of artificial fertilizer and chemical substances and agro technical deadlines observation	54.366 <sup>a</sup>	.134*
	3.708 <sup>b</sup>	.691**

a,df=15, Asymp. Sig. (2-sided) = .000; b, df=9, Asymp. Sig. (2-sided) = .000

\*\* Correlation is significant at the 0.01 level (2-tailed); \* Correlation is significant at the 0.05 level (2-tailed).

**Table 5- Disposing containers and unused chemicals**

*Çizelge 5- Kullanılmayan ilaçların ve depoların elden çıkartılması*

	Frequency	Percent	Valid percent	Cumulative percent
Keep them at home	37	11.2	11.2	11.2
Throw them in a dump	146	44.2	44.2	55.5
Throw them into the river or a remote place	65	19.7	19.7	75.2
Other	82	24.8	24.8	100.0
Total	330	100.0	100.0	

It seems that the surveyed farmers in Serbia are still not sufficiently informed about the importance of the green production. In fact, only 29% chose to switch to green farming, 47.3% have not made their decisions yet, 22.6% do not plan to switch to this type of production, while negligible percentage (1.2%) is engaged in green farming. The highest percentage of the respondents state that the financial problems are the cause of not moving to organic production. In fact, 34.8% of the surveyed subjects claim that the lack of funding for labor costs, production equipment, the costs of introducing new technologies and solutions, as well as the costs of environmental protection are the main reason of failure to convert to environmentally sustainable production, which includes the retention of soil fertility, exclusion and reducing environmental pollution, maintaining production level and improving health and human life. From the rest of the respondents, 5.2% claim that they do not switch to organic farming due to political reasons, 6.1% think it is because of waste, 7.3% think felt that they were various reasons, while 8.2% did not know the nature of the difficulties. (Compare the results of the survey on the attitudes of farmers engaged in organic and conventional farming, the economic risks and environmental, for example Al-Rimawi et al 2004; Bruening et al 1992; Dantsis et al 2009; Farouque & Takeya 2007; Karami & Mansoorbadi 2008; Mccann et al 1997; Mokhtar et al 2012).

Based on the obtained results, it can be concluded that the respondents do not have enough information

about the economic effects of switching to organic farming. The largest number (36.1%) did not know which type of production is more profitable, 34.5% felt that the traditional production is cost effective, while 29.4% of the respondents think that green farming is better. Based on the coefficient of correlation, there was no association between age and the response to the previous question, but the correlation coefficient indicated a negligible correlation between the level of education and opinions about the economic effects of agricultural production.

Regardless of the previous answers that indicate a relatively low level of environmental awareness among the respondents, when asked What is the most common environmental practice in agricultural production?, the largest percentage of respondents (51.7%), regardless of their age and level of education, believe that it is a possibility to preserve the environment. Other respondents make associations between environmental practice and the possibility to make an extra profit (23.1%); there are those who think that it is the possibility to enter new markets (23.4%), while 1.8% thinks that it is one of the ways to limit production (Table 6).

On the basis of the values in Table 7, the hypothesis is that the place of soil in the farmers' value systems influences their ecological behavior.  $\chi^2$  values are smaller than the limit values, whereas the correlation coefficient does not indicate the correlation between the place of soil in the farmers' value systems and the used chemical substances package disposal, acceptance

**Table 6- Environmental practice in agricultural production**

*Çizelge 6- Tarımsal üretimde çevresel uygulamalar*

	Frequency	Percent	Valid percent	Cumulative percent	
Valid	Possibility to make an extra profit	76	23.0	23.1	23.1
	Possibility to preserve the environment	170	51.5	51.7	74.8
	Possibility to enter new markets	77	23.3	23.4	98.2
	Limited production	6	1.8	1.8	100.0
	Total	329	99.7	100.0	
	Missing System	1	0.3		
	Total	330	100.0		

of ecological production and the realization of ecological production profitability. Although the correlation coefficient does not indicate that there is statistical significance in the correlation between soil significance in the farmers' value systems and ecological practice.  $\chi^2$  value is higher than the limit therefore only the fourth part of the hypothesis referring to the correlation between the place of soil in their value system and realization of ecological practice significance is accepted.

Majority of the surveyed subjects (51.2%) think that they are sufficiently informed about the importance of ecologization of agricultural policies, while 48.8% never heard of this process. The data indicate that only 14.2% have detailed and full information about the *EU agricultural policy*, 28.8% has partial information, whereas 28.2% do not have any information. To sum up, 57% of the respondents do not have any information, or have a little information on the EU agricultural policy. Therefore, it is not surprising that only 48.8% of the respondents have partial knowledge of the requirements for their agricultural activity in order to obtain the EU funds, 23.6% of the respondents do not have any knowledge about it, while only

27.6% of the respondents have such knowledge. The need for information on EU agricultural policy is expressed in 74.8% respondents.

The  $\chi^2$  values in Table 8 show that the assumption that knowledge level does not depend on the information method thus not influencing the access to the EU funds should be rejected. The correlation coefficient shows that there is high correlation between complete information and the method of information given by the experts and access to the EU funds. At the same time,  $\chi^2$  value greater than the limit confirms a part of the sixth hypothesis showing that the information level influences the need for additional information in the field and that this information is necessary to those who are partially or minimally informed. However, the subjects are missing valid information on agricultural policies in our country, since a quarter of respondents (25.2%) do not have any information. The reasons for poor awareness might be found in the way of informing - 13.3% get this information from competent departments for forestry and farming, whereas 6.4% obtain this information from producers' associations. The most common sources of information are talks with relatives and colleagues (19.1%) and media (29.4%).

**Table 7- Soil in the farmers' value systems and**

*Çizelge 7- Çiftçilerin değer sistemlerindeki toprak ve*

	<i>Pearson chi-square</i>	<i>Pearson correlation</i>
Used chemical substances package disposal	19.422a	0.058
Acceptance of ecologically production	18.430b	0.007
Ecologically clean production profitability	14.009c	0.029
Ecological practice significance	23.440d	0.037

a, df=12, Asymp. Sig. (2-sided) =0.079; b, df=12, Asymp. Sig. (2-sided) =0.103; c, df=8, Asymp. Sig. (2-sided) =0.082; d, df=8, Asymp. Sig. (2-sided) =0.024

**Table 8- Level of informations and**

*Çizelge 8-Bilgi seviyesi ve*

	<i>Pearson chi-square</i>	<i>Pearson correlation</i>
Information method	1.599 <sup>a</sup>	.466**
Accessibility to european funds	1.253 <sup>b</sup>	.540**
Need for additional information	8.510 <sup>c</sup>	.138*

a, df=15, Asymp. Sig. (2-sided) = .000; b, df=6, Asymp. Sig. (2-sided) = .000, c, df=3, Asymp. Sig. (2-sided) = .037; the stars standing next to said correlation, in this way: \*\*Correlation, as in the Table 4.

Correlation is significant at the 0.01 level (2-tailed); \*. Correlation is significant at the 0.05 level (2-tailed).

3.1.1. Level of education and ecological culture

On the basis of the  $\chi^2$  test the assumptions that there is correlation between the level of education and; realization of agricultural production influence on the environment, the cause of agricultural pollution of the environment, the significance of future soil preservation, acceptance of ecologically clean production, the information level of agricultural production ecologization, the possibilities of

obtaining foreign benefits, information method and the need for additional agricultural information, are rejected.  $\chi^2$  test values prove that there is correlation between the level of education and the place of soil in the examine value systems, consideration of soil quality and growing technologies, the use of the experts' help, chemical substances package disposal and realization of the traditional and ecological production effects (Table 9).

**Table 9- The relationship between level of education and ecological culture**

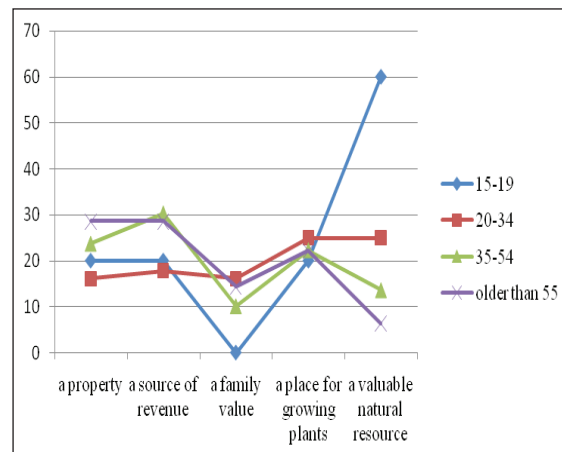
Çizelge 9-Eğitim seviyesi ve ekolojik kültür arasındaki ilişki

	Pearson chi-square
Level of education + what is soil for you?	54.351 <sup>a</sup>
Level of education + soil quality	51.160 <sup>b</sup>
Level of education + experts help	42.056 <sup>c</sup>
Level of education + disposing containers and unused chemicals	35.416 <sup>d</sup>
Level of education + green production in follow periode	21.900 <sup>e</sup>
Level of education + What is more cost effective: Green or tradicionale agriculture	21.483 <sup>f</sup>

a, df=24, Asymp. Sig. (2-sided) = .000; b, df=18, Asymp. Sig. (2-sided) = .017; c, df=18, Asymp. Sig. (2-sided) = .000; d, df=18, Asymp. Sig. (2-sided) = .001; e, df=18, Asymp. Sig. (2-sided) = .008; f, df=12, Asymp. Sig. (2-sided) = .044

3.1.2. The farmers' age and ecological culture

The obtained correlation coefficient values, excluding two cases, did not confirm the correlation between the farmer's age and ecological culture development level. As is seen from Figure 1, the correlation between the farmers' age and the realization of the importance of soil as a valuable natural resource is inversely proportional. The same number of respondents aged between 20 and 34 states that soil is the place for growing crops and valuable natural resource (25.0% each). For the respondents aged 35-54, soil is primary a source of income (30.3%), property (23.7%), place for crops growing (22.3%), followed by a valuable natural resource (13.6%). Most of the respondents older than 55 years of age state that for them soil is property and a source of income (28.6%), place for crops growing (22.2%), family value (14.3%) and the smallest percent of the respondents that soil is a valuable natural resource (Figure 1).



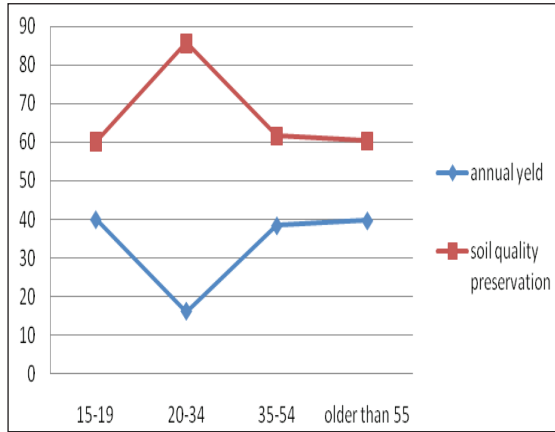
\*\* . Correlation is significant at the 0.01 level (2-tailed)

**Figure 1- The farmers' age and the place of soil in their value systems**

Şekil 1-Çiftçilerin yaşı ve değer sistemlerindeki toprağın yeri



Figure 2 shows that after 35 years of age there is declining trend in the assumption that it is of most importance to preserve the future soil quality, and a rising trend in the assumption that profit is what is important.



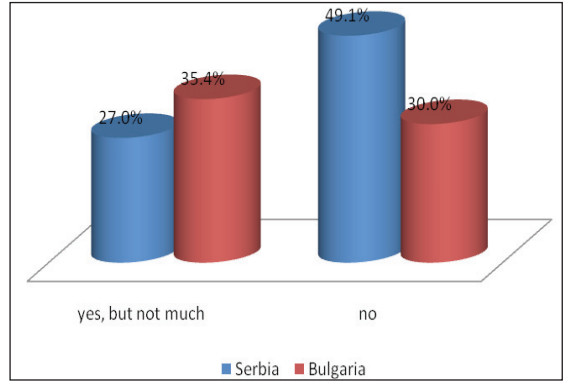
\*\* Correlation is significant at the 0.01 level (2-tailed).

**Figure 2- The farmers' age and the expectations as regards the soil**

Şekil 2- Çiftçilerin yaşı ve topraktan beklentileri

### 3.2. Ecological culture of farmers in Serbia and Bulgaria – a comparative overview

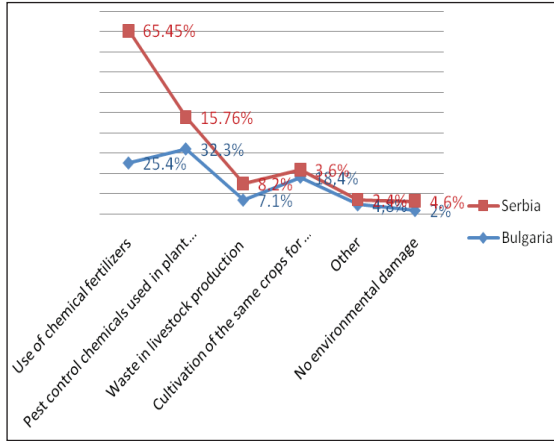
Comparison of the data obtained in our research with the data obtained in Bulgaria in Blagoevgrad region (Yovchevska 2010) show that the degree of development of farmers' ecological culture in these two states, or these two regions, is at a relatively similar level. Most of the respondents in both countries state that agricultural production endangers the natural environment but there are also those (not many) who state that it does not endanger the environment at all (Figure 3). 19.1% less respondents from Bulgaria compared of respondents from the Serbia said that agricultural activity did not threaten the environment, while there were 8.4% more respondents in Bulgaria who said that agricultural activity threatened the environment, but not much.



**Figure 3- The most frequent attitudes about the relationship between agricultural production and environment in Bulgaria and Serbia**

Şekil 3- Bulgaristan ve Sırbistan'da tarımsal üretim ve çevre arasındaki ilişkilerde en sık karşılaşılan davranışlar

In contrast to the data obtained in Serbia, in Bulgarian sample there were differences in the attitudes about the relationship between agricultural production and the environment due to the age of the respondents. The majority of the young people (over 50%), aged between 18 and 29, answered *yes* or *yes, but not much*. The percentage of respondents who believe that agricultural production threaten the environment decreases with age, since there were no examines over 50 years of age who gave the same answer. The highest percentage of respondents over 50 believed that farming is not a big environmental threat (Yovchevska 2010). Minor differences can be observed in the response to the question of what is most harmful in agricultural production. Contrary to the respondents from Serbia, the respondents from Bulgaria believe that the biggest polluters are chemical fertilizers, chemical products for pest control used in crop production, cultivation of the same crops for several years in a row (monoculture). There is a small half number of the respondents from Bulgaria who believe that farming is not harmful to environment (Yovchevska 2010). The biggest percentage difference was observed in the attitudes about hazard assessment of chemical fertilizers and monoculture growth between the respondents in Serbia and Bulgaria (Figure 4).

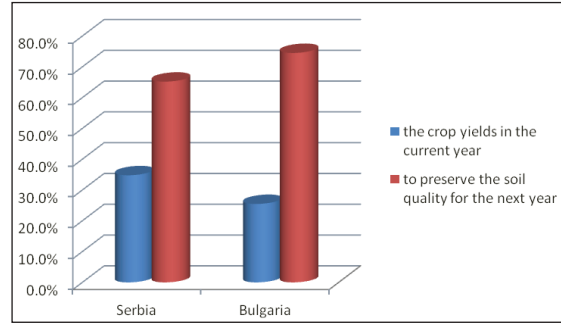


**Figure 4- What do the respondents from Bulgaria and Serbia consider to be the most harmful to the environment**

Şekil 4- Bulgaristan ve Sırbistan'daki katılımcıların çevreye en zararlı kabul ettikleri işlemler

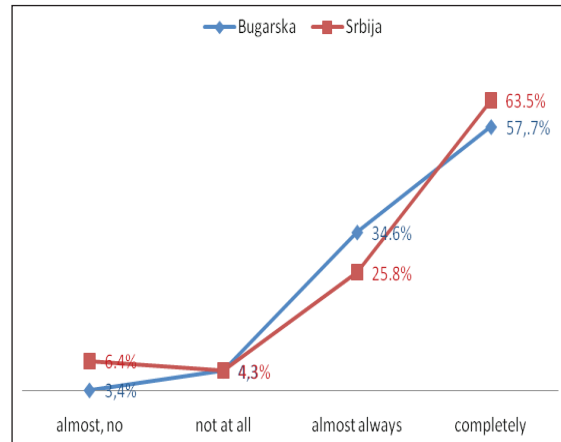
In Bulgarian sample, 74.5% of the subjects believe that it is more important to preserve the soil quality for the next year, while 25.5% of the subjects believe those are the crop yields in the current year (Yovchevska 2010). The comparison of the responses received indicates that the Bulgarian respondents are more aware of the importance of soil preservation than the Serbian respondents (Figure 5). Cumulatively, more subjects from (10.7%) never or almost never take care about the soil quality while selecting which plant culture they will grow, whereas a higher percentage (63.5%) always take care about it. In Bulgaria, 7.7% does not care about the soil quality (3.4% almost never and 4.3% never), while higher cumulative percentage of 92.3% take care about soil quality (34.6% almost always, and 57.7% always) (Figure 5 & Figure 6).

The farmers from both countries usually consult with vendors (shop assistants) about the use of fertilizers and chemicals. However, the highest percentage of respondents from Serbia, apart from vendors, seeks advice from experts; on the other hand, Bulgarian farmers often seek advice from



**Figure 5- The opinions of the respondents from Bulgaria and Serbia about the importance of yield and preserving soil quality**

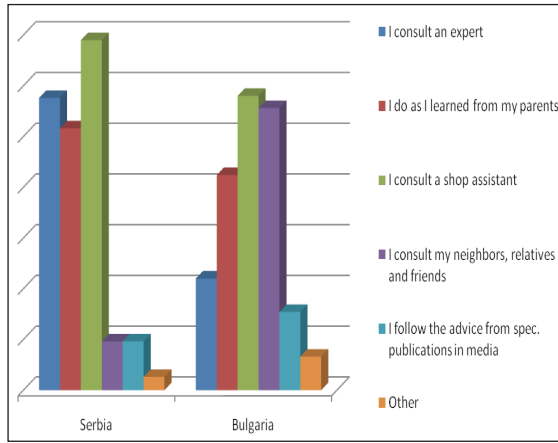
Şekil 5- Bulgaristan ve Sırbistan'daki katılımcıların verim ve toprak kalitesinin korunması ve önemi hakkındaki görüşleri



**Figure 6- Soil quality and choice of culture in Serbia and Bulgaria**

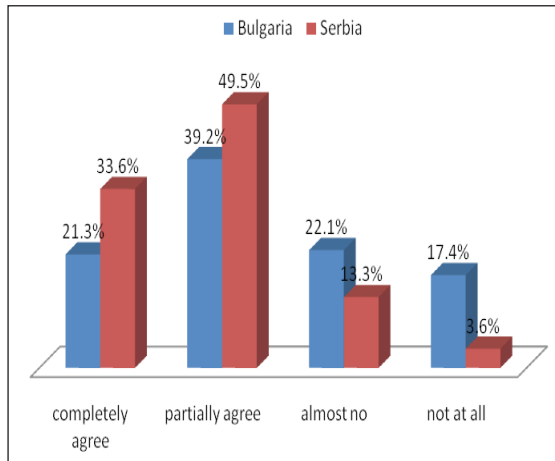
Şekil 6- Sırbistan ve Bulgaristan'da kültür seçimi ve toprak kalitesi

their neighbors, relatives and friends. Comparison of the data shows that few respondents follow the advice from specialized publications and media, but this way of getting informed is more prevalent in subjects from Bulgaria than in Serbia (Figure 7). The data about agro-technical deadlines were also similar (Figure 8).



**Figure 7- The way of getting informed about the use of chemicals and fertilizers**

Şekil 7- Kimyasallar ve gübre kullanımı hakkında bilgi sahibi olma yolları



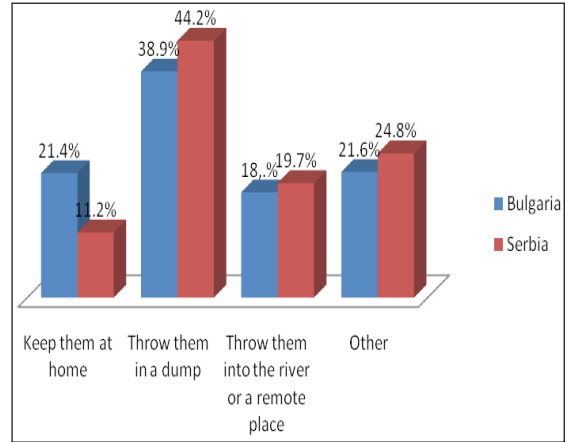
**Figure 8- Sticking to agro-technical deadlines in Bulgaria and Serbia**

Şekil 8- Bulgaristan ve Sırbistan'da tarım tekniklerinin uygulama sürelerine bağlı kalma

In both countries, the highest percentage of farmers complies with agro-technical deadlines in some degree (49.5% in Serbia and 39.2% in Bulgaria), completely stick to deadline (33.6% in Serbia and 21.3% in Bulgaria), almost never meet the deadline (13.3% in Serbia and 22.1% in Bulgaria) and never (3.6% in Serbia and even

17.4% in Bulgaria) (Data for Bulgaria: Yovchevska 2010b). To sum up, 17.1% more farmers in Serbia completely or partly stick to the deadlines, than the farmers in Bulgaria.

In both countries, the majorities of respondents dispose of unnecessary chemicals in dumps or keep them in their houses (Figure 9).



**Figure 9- Comparative overview of unnecessary chemical disposal**

Şekil 9- Bulgaristan ve Sırbistanda gereksiz kimyasallardan kurtulma yöntemleri

In Bulgaria, 38.9% of the respondents dispose of unnecessary packaging and chemicals in the dump, 21.4% keep them at home, 18.1% throw them into the river, while 21.6% solve this in another way (Mantarova 2010). It is interesting that 10.2% more farmers from Bulgaria keep unnecessary chemicals in their houses, in comparison to the farmers in Serbia.

It is interesting that even Bulgarian farmers are not sufficiently informed about the need for harmonizing their production with the EU requirements and the possible use of the European aid for the development of agricultural production. Only 9.7% have complete information about it, 58.7% have only general information, while 31.6% are not familiar with this kind of funding. The largest number of farmers, as well as in Serbia, get informed over the media (23.1%), competent

departments for farming and forestry (15.9%), colleagues and relatives (15.7%), over producers' associations (5,5%) and others (8.2 %). Nearly all respondents (or 94.7%) reported the need for information on EU agricultural policy (Yovchevska 2010b).

#### 4. Conclusions

The results of the research in Serbia suggest that ecological culture of farmers is only partially developed, because farmers are not fully aware of the connection between their activities and environmental disturbances. More than half of the respondents use chemical fertilizers to supply plant nutrients, and chemical preparations to struggle against pest, and only partially comply with agricultural deadlines, although they consider chemical products to be the biggest environmental pollutants. Packaging and residues of chemicals are not disposed of properly. One of the causes of inadequate waste disposal is the fact that organized collection of waste in rural areas has been recently organized. On the basis of the obtained data, it can be concluded that the environmental awareness, as the basic constituent of ecological culture, is at a low level and that level of its development is not determined by age and educational level. Our results are partially consistent with the results of the conducted research (Hoque et al 2008; Mokhtar et al 2012; Payne & White 2006). The obtained data also indicate that there is latent environmental awareness, lack of information about the importance and economic effects of green agriculture, agricultural policy the European Union. In contrast to these data, there are data that indicate a sufficient awareness of the importance of success factors in agricultural production.

Starting from the obtained results, Bulgarian researchers concluded that agricultural production in the region Blagoevgrad is in harmony with the environment, and the farmers have a positive attitude about the place and the role of agriculture in protection and preservation of the environment (Yovchevska 2010). It seems that scientific and professional audience, government agencies,

professional organizations, NGOs and media in both countries must pay more attention to developing environmental awareness and ecological culture in farmers. Hiring professionals with specific theoretical and applied knowledge based on new technologies which include management, use and conservation of natural resources with economic benefits, not only provides high biologically valuable products, but also has a positive impact on the environment, respecting environmental principles and contributing to environmental standards of production.

Therefore, activity of the state and all relevant factors must be aimed at improving farmers' knowledge and skills necessary to create conditions in which local resources will be used efficiently, without great losses, and environmental pollution will be reduced to the levels that do not cause great environmental damage. Also, stimulating agrarian policy and better subsidy policy from agricultural budget should encourage, stimulate and develop ecological agriculture. Only by raising the level of farmers' environmental awareness, we can create a positive attitude towards nature, improve the level of knowledge about the general agricultural policy and create opportunities for active participation in the improvement of all aspects of agricultural production. In that sense, personal professional services and associations of producers should be actively involved in informing the producers on issues related to national agricultural policy; also, it is necessary to improve information on the EU agricultural policy and work on manifest expression of environmental awareness.

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