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THE IMPACT OF AGRICULTURE ON THE NATURAL ENVIRONMENT ACCORDING TO ACADEMIC YOUTH

Abstract: The main aim of this study is to assess the level of awareness of the impact of agricultural production on the natural environment in a group of academic youth and to define selected socio-demographic factors determining it. The main source of data used was primary information from the author's own study. University students from the Małopolskie Voivodship were interviewed (436 persons). Statistical analysis of the researched material comprised summary statistical measurements and non-parametric χ^2 test. Conducted research demonstrates that the majority of academic youth does not even have elementary knowledge about the negative impact of agriculture on the natural environment. Only 15% of students have a high agricultural awareness level. The factors determining the level of ecological awareness in this group were gender and the place of residence. Men and inhabitants of urban areas had a higher level of knowledge about the degradation of the natural environment as a result of agricultural production.

Key words: academic youth, ecological awareness, agriculture, natural environment

INTRODUCTION

Environmental risks are not only a problem of urban agglomerations, but also of rural areas. B. Perepeczko [2012] states that there is a stereotype of exclusively environment-friendly agriculture. However, agricultural production, due to the achievements in science and technology and the lack of awareness and morality of producers, may be much more damaging to the natural environment than it used to be.

Intensive agricultural production is a serious threat for the environment and may lead to its degradation through [Bujanowicz-Harnaś 2007, Ochrona…2010, Wielogórska, Turska, Czarnocki 2011]:

- contamination of surface waters due to the incorrect use of fertilizers, in particular nitrogenous and phosphorous,
- soil and water contamination with residues of chemical plant protection products,
- incorrect wastewater management in agricultural holdings,
- intensification of different types of erosion and fertility reduction of soil;
- emission of gas substances (ammonia, methane, carbon dioxide, hydrogen sulphide) from intense husbandry or breeding of animals, into the air,
- emission of particulate substances (dust from litter, feed mills warehouses, cereal dryers, or other farm buildings) from intense husbandry or breeding of animals, into the air,
- landscape changes and extinction of particular species of fauna and flora.

Separating and determining the impact of agriculture on the natural environment is a very difficult task, due to, among other things, sector flows and a broad spectrum of dependencies [Kagan 2009]. Agricultural raw materials are used in not only agri-food processing for feed and food purposes, but also in other industry branches, such as pharmaceutical, chemical, cosmetic, textile, or energetic industries [Piwowar 2014]. On the other hand, agriculture uses goods manufactured in other sectors. It "consumes" energy carriers, machines, construction materials, mineral fertilizers, and plant protection products. The process of production of these goods alone affects the natural environment, producing particular consequences [Kagan 2011].

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According to A. Kagan [2011], in order to limit the negative impact of agriculture on the natural environment, the continuous search and implementation of pro-environment innovation is necessary. These changes should occur in agricultural holdings and in other units of the agribusiness. For this purpose, changes in lifestyle and behaviour of agricultural holdings owners and, in particular, consumers are needed. Households, impacting production means suppliers, agricultural raw materials recipients, and trade put the most effective pressure on agricultural holdings, motivating them to treat the natural environment differently. To ensure the efficiency of such actions, the consumers should be aware of the negative impact of agriculture on the natural environment.

The main aim of this study is to assess the level of awareness of the impact of agricultural production on the natural environment in a group of academic youth and to define selected socio-demographic factors determining it. Such a choice of respondents is due to the fact that the preferences and attitudes of this group will soon affect the direction of development of particular markets.

METHODOLOGY

The main source of data used was primary information from the author's own study. The research was conducted in the Q4 2016 using the PAPI method. The sample size was 436 persons. University students from the Małopolskie Voivodship were interviewed. In the 2014/2015 academic year, the number of university students in the analysed Voivodship was 182,597 [Szkoły… 2015]. Purposive sampling was used. To estimate the minimal sample size, the following formula was used [Szreder 2004]:

$$n = \frac{\frac{1}{4} \cdot N}{N \cdot \frac{d^2}{z^2_{\alpha/2}} + \frac{1}{4}}$$

where:

N — population size,
d — statistical error,
$Z^2_{\alpha/2}$ — the value of random variable Z of normal standard distribution.

The maximal value of the statistical error of the result was assumed as 5%. The necessary minimal sample size was determined as 433 persons. 450 students participated in the study. After excluding inconsistent and incorrectly filled questionnaires, data from 436 questionnaires was further analyzed.

The gender composition of the sample reflects the general population. 59% of the respondents were women and 41% were men (table 1). Almost 55% of the respondents lived in rural areas, the remaining persons lived in urban areas. Almost 15% of the studied population indicated that they lived in cities over of 100,000 inhabitants. Half of the inhabitants of rural areas lived in an agricultural households. The average area of such agricultural holdings was 7.6 ha. The smallest agricultural holding was 1 ha, the largest 70 ha. Almost 2/3 of the respondents stated that they had family members/friends working in agriculture and 53% indicated that their family members/friends worked in remaining agribusiness aggregates.

The research on the level of awareness of the impact of agricultural production on the natural environment in academic youth was one of seven parts of a research subject regarding determining the level of agricultural awareness in academic youth. The ecological awareness index (EAI) was used to measure the awareness of the impact of agricultural production on the natural

environment[25]. The index was constructed based on the principles described by B. Birkenholz [1993]. The questionnaire he proposed allows taking the differences of agribusiness system between particular countries into account. The questionnaire had two parts. The first part contained statements requiring marking a positive ("yes") or negative ("no") answer or declaring a lack of knowledge ("I do not know"). The second part contained the respondent's particulars. 10 questions regarded the negative impact of agriculture on the natural environment (its impact on water, soil, and air pollution, soil erosion, landscape changes). The maximum score was 10 points, the minimum 0 points.

Table 1. The structure of the respondents (%)

Specification		Share in the sample (%)
Gender	Woman	59
	Man	41
Place of residence	Village	55
	City to 100 thousand residents	31
	City over 100 thousand residents	14
The respondent works on his own farm or parents' farm	Yes	23
	No	77
Acquaintances who work in agriculture	Yes	67
	No	33
Acquaintances who work in I (supply) and in III (processing) aggregates of agribusiness	Yes	46
	No	54

Źródło: own research, n=436

The statistical analysis of the studied material encompassed aggregate statistical indicators as well as the non-parametric "chi square" (χ^2) test allowing the assessment of the significance of relationship between variables if at least one of them is non-measurable. All the hypotheses were verified on the significance level $\alpha = 0.05$. Apart from the primary sources, secondary sources, which encompassed both domestic and foreign literature, were used. The results were presented in a descriptive, tabular and graphic form.

THE LEVEL OF ECOLOGICAL AWARENESS OF UNIVERSITY STUDENTS OF THE IMPACT OF AGRICULTURE ON THE NATURAL ENVIRONMENT

As stated before, the knowledge of the impact of agriculture on the natural environment is an element of citizens' agricultural awareness, which also includes the importance of agriculture, agricultural policy, animal and plant production, processing, and marketing [Meischen, Trexler 2003]. Analyzing all the required question groups, one can observe that the questions regarding the influence of agriculture on the natural environment had the smallest percentage of correct answers (only 43%). The percentages of correct and incorrect answers were identical (table 2). Almost 15% respondents chose "I do not know". The comparison of these results with the results obtained in other European Union countries reveals that young people from Austria and Germany have a higher

[25] In this study, the ecological awareness and the calculated index (EAI) regards only knowledge, beliefs, and views of young people on environment degradation as a result of agricultural activities.

level of ecological awareness. The lowest level of ecological awareness is observed in young citizens of Greece, Cyprus, Romania, and Bulgaria [Ruben, Blanco 2010].

Table 2. The respondents' answers concerning basic knowledge about agriculture (%)

Specification	Correct answers	Incorrect answers	The answer "I don't know"
Importance of agriculture	70	13	17
Agricultural policy	53	19	28
Natural environment	**43**	**43**	**14**
Plant production	79	11	10
Animal production	91	7	2
Food processing	48	26	26
Marketing	56	15	29
Total	63	19	18

Source: own research, n=436

The average value of the ecological awareness index for this group is 4.32 points. Among the respondents, no one answered all the questions incorrectly. However, quite a high percentage of students (33%) knew the answer to only one question. Almost 35 respondents (2%) answered all the questions correctly (scoring 10 points). In order to verify the result using the χ^2 test, the results were divided into three ranges: a low level of ecological awareness (0–3 points), a medium level (4–6 points), and a high level (7-10 points). As shown on figure 1, 60% of the respondents had an average level of ecological awareness, one in four — low, and one in seven high (fig. 1).

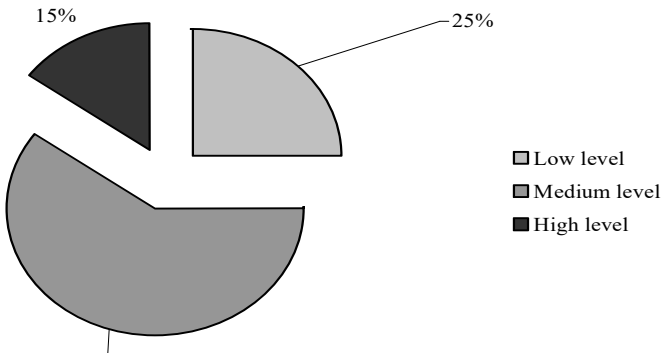

Fig. 1. Levels of the ecological awareness index for respondents (%)

Source: own research, n=436

Based on the conducted analysis, one can state that the level of knowledge about the impact of agriculture on the environment is determined by several factors, one of which is gender. Women

were characterized by a lower level of knowledge of this subject (table 3). The average result in women was 2.1 points, whereas in men it was 5.2 points. A little over 80% women had an average level of ecological awareness, the level of the remaining female respondents (19%) was low. No woman had a high index level. Therefore, in this case the χ^2 test could not be performed, as the minimal number of answers in the contingency table should be 8 [Kukuła, 2012]. In comparison, one in four men had a high level of ecological awareness.

Table 3. Respondents structure according to the level of ecological awareness (%)

Specification		Level of ecological awareness		
		Low	Medium	High
Gender	Woman	19	81	0
	Man	26	48	26
Place of residence	Village	25	62	13
	City	18	55	27
The respondent works on his own farm or parents' farm	Yes	25	54	21
	No	20	73	7
Acquaintances who work in agriculture	Yes	71	21	8
	No	73	27	0
Acquaintances who work in I (supply) and in III (processing) aggregates of agribusiness	Yes	80	15	5
	No	65	30	5

Source: own research, n=436

Another factor determining the awareness of the negative impact of agriculture on the natural environment is the place of residence. According to the conducted studies, the inhabitants of urban areas had a higher level of agricultural awareness. The average score of this group was 4.5 points. The inhabitants of rural areas scored 3 points less. The χ^2 test analysis showed that there are statistically significant differences in the level of agricultural awareness between the inhabitants of rural and urban areas (χ^2=10.8; *df*=2), which corresponds with the results obtained by other researchers [Perepeczko, 2012]. In the case of the respondents from both urban and rural areas, the majority had an average level of ecological awareness, but there were fewer people in the third group (high level) and more people in the first group (low level) among the inhabitants of rural areas in comparison with the inhabitants of urban areas.

The statistical analysis shows that the level of agricultural knowledge also depends on whether the respondent's parents has an agricultural holding (χ^2=16.3; *df*=2). 1/4 of the respondents owning an agricultural holding had a low level of ecological awareness and a little over 50% of the respondents from this group achieved an average result. The remaining persons had the highest level of awareness of negative impact of agriculture on the natural environment. According to B. Perepeczko [2012], the level of ecological awareness in farmer families correlates with the area of the holding. The highest level is observed in owners of the smallest holdings (1–2 ha) and owners of holdings over 20 ha.

In the group not related with agricultural holding management, the majority had an average awareness level (73%). The remaining respondents had either a low (20%) or a high (7%) level.

Having family members/friends working in agriculture (χ^2=4.8, *df*=2) or other agribusiness system aggregates (χ^2=1.3, *df*=2) does not affect the ecological awareness of an individual. The average score, both for the respondents, the family members/friends of whom work in agribusiness system aggregates (supply, agriculture, processing, and trade) and the respondents without such acquaintances was 4.1.

CONCLUSIONS

The conducted research allowed the level of ecological awareness of academic youth in the Małopolskie Voivodship to be defined and the selected factors determining it to be determined. The ecological awareness index was used for that purpose. The conducted research demonstrates that the majority of academic youth does not even have elementary knowledge about the negative impact of agriculture on the natural environment. Among all the modules constituting the agricultural knowledge index, the percentage of incorrect answers was the highest in the module concerning the impact of agriculture on the natural environment. This means that the way of teaching about the impact of agriculture on the natural environment at all levels of school as well as the methods of education of the whole society are not effective enough and insufficient. Educational actions raising the awareness of young people regarding the potential risks of agricultural production for the natural environment is needed.

The factors determining the level of awareness in this group were gender and place of residence. Men and inhabitants of urban areas had a higher level of agricultural awareness. The relation between the level of ecological awareness of a young person and having parents/family members who work in agriculture and remaining aggregate of the agribusiness was not observed.

Young people respect and protect the natural environment when they understand its processes and results of degradation. Therefore, research assessing the citizens' level of knowledge about the impact of agriculture on the natural environment should continue and the information obtained should be used to elaborate teaching programmes and planning campaigns on popularising this knowledge in the society.

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