Acta Sci. Pol.
Formatio Circumiectus 24 (1) 2025, 3–13
ENVIRONMENTAL PROCESSES

www.acta.urk.edu.pl ISSN 1644-0765 DOI: http://dx.doi.org/10.15576/ASP.FC/199864

ORIGINAL PAPER Accepted: 7.01.2025

# EVALUATING THE ENVIRONMENTAL SUSTAINABILITY AWARENESS OF PADDY PRODUCERS IN THE MERIÇ PLAIN (NORTHWEST TURKEY): A COMPREHENSIVE STATISTICAL APPROACH

İpek Atılgan Helvacioğlu[1] 0000-0002-3841-1206, Ali Gülbaşı[2] 0000-0003-1102-414X, Cem Tokatlı[1]✉ 0000-0003-2080-7920

[1] Trakya University, Edirne, Turkey
[2] Kütahya Dumlupınar University, Kütahya, Turkey

## ABSTRACT

### Aim of the study
The Meriç Plain, a critical agricultural region known as the "Rice Land" in Turkey, hosts the country's largest rice cultivation area. This study examines the environmental sustainability awareness of rice farmers in the region.

### Material and methods
Data were collected from 103 farmers using a convenience sampling method and statistically analysed using SPSS 27 software.

### Results and conclusions
The findings revealed that environmental sustainability awareness is not significantly influenced by demographic factors such as age or income, while the level of education has a significant positive impact. Farmers with only primary education exhibited significantly lower awareness compared to those with higher education levels. No significant difference was observed among those with high school, associate, and bachelor's degrees, indicating that awareness stabilizes after a certain educational threshold.

**Keywords:** Meriç Plain, rice producers, environmental sustainability awareness, statistical assessment

## INTRODUCTION

Rice, an economically significant agricultural product, is closely linked to global food security as a staple food source. In this context, rice production and trade play a critical role in the economic balance of many countries. Rice production in the agricultural sector requires the effective use of modern farming methods and technologies. Additionally, improving quality standards, ensuring product safety, and adopting sustainable farming practices will contribute to rice producers gaining a competitive advantage. In the 2022–2023 period, global paddy production reached 770.6 million tons, while rice production was 515.8 million tons. China leads in paddy production with 144.6 million tons, followed by India with 134 million tons. Asian countries are also leaders in rice consumption. In rice exports, India is the leader with 16 million tons. The country with the highest rice imports is the Philippines, with 4.2 million tons (Ministry of Agri-

✉e-mail: tokatlicem@gmail.com

culture and Forestry, 2023; Turkish Seed Union, 2023; Turkish Statistical Institute, 2023).

Turkey holds a prominent position in rice cultivation and production, with activities predominantly concentrated in the Marmara Region. Provinces such as Edirne, Samsun, and Balıkesir play key roles in large-scale rice production. By 2021, Turkey's rice cultivation area expanded to 129,490 hectares, yielding approximately 1 million tons of rice. While annual domestic consumption is around 700,000 tons, with an average per capita consumption of 10 kilograms, 150,000 to 200,000 tons of rice are imported annually to meet demand. Significant progress in rice production has been achieved through the adoption of high-yield varieties, such as Osmancık-97, and the implementation of modern agricultural techniques (Ministry of Agriculture and Forestry, 2023; Turkish Seed Union, 2023; Turkish Statistical Institute, 2023).

The Meriç Delta is particularly critical to Turkey's rice production. With its fertile soils and ample water resources, the region hosts one of the largest rice cultivation areas in the country, contributing substantially to national production. The extensive irrigation infrastructure the Meriç River provides is vital in ensuring sustainable rice farming. Beyond its agricultural contributions, rice cultivation in the region significantly impacts the local economy, generating employment and fostering economic development. Consequently, the Meriç Delta holds strategic importance in both economic and environmental terms (Ministry of Agriculture and Forestry, 2023; Turkish Seed Union, 2023; Turkish Statistical Institute, 2023).

However, monocultural rice production in the Meriç Delta presents significant environmental challenges. Continuous cultivation of rice over decades without crop rotation or fallow periods has led to reduced soil fertility, contamination of water resources, and biodiversity loss. Monoculture practices, characterized by the repeated cultivation of the same crop in the same area, deplete soil nutrients over time. Additionally, the intensive use of water resources and excessive application of chemical fertilizers have exacerbated water pollution and ecosystem degradation. Addressing these challenges necessitates a focus on environmental sustainability, which emphasizes the responsible use of natural resources and the maintenance of ecological balance to ensure long-term agricultural productivity (Yoşumaz and Uzun, 2024). Rice farming in the Meriç Plain, conducted without rotation for over 60 years, has intensified these environmental concerns, with increasing reliance on chemical inputs compounding the issue. Recent environmental studies emphasize that monoculture is a primary stressor on the region's ecological balance (Tokatlı, 2015; 2019; 2020; Tokatlı and Ustaoğlu, 2020; Tokatlı et al., 2020; Tokatlı and Varol, 2021; Tokatlı and İslam, 2023).

The study's aims are threefold:

– to examine the socio-economic characteristics of rice farmers in the Meriç Plain;
– to assess their environmental sensitivity;
– to statistically analyse the impact of socio-economic factors on their environmental sustainability awareness through systematic data collection techniques.

## MATERIAL AND METHOD

In this study, a causal-comparative research design was used in accordance with the research objectives. In causal-comparative research, the research process begins after a situation or event has occurred. In this research model, the universe is formed without the intervention of the individuals involved in the event or the researcher. The universe naturally exists with the occurrence of the situation to be investigated, and the sample of the research is selected from this group (Büyüköztürk et al., 2013). The universe of the research consists of rice producers farming in the Meriç Plain (Edirne). From these producers, 103 were selected as the sample of the research using the convenience sampling method. The topographic map of the Meriç River Basin, which shows the Meriç Plain, which constitutes our study area and sample universe, is given in Figure 1.

The hypotheses presented within the scope of the research are as follows (Fig. 1):

**H1:** There is a significant difference between environmental sustainability awareness and age in rice production.

**H2:** There is a significant difference between environmental sustainability awareness and monthly income in rice production.

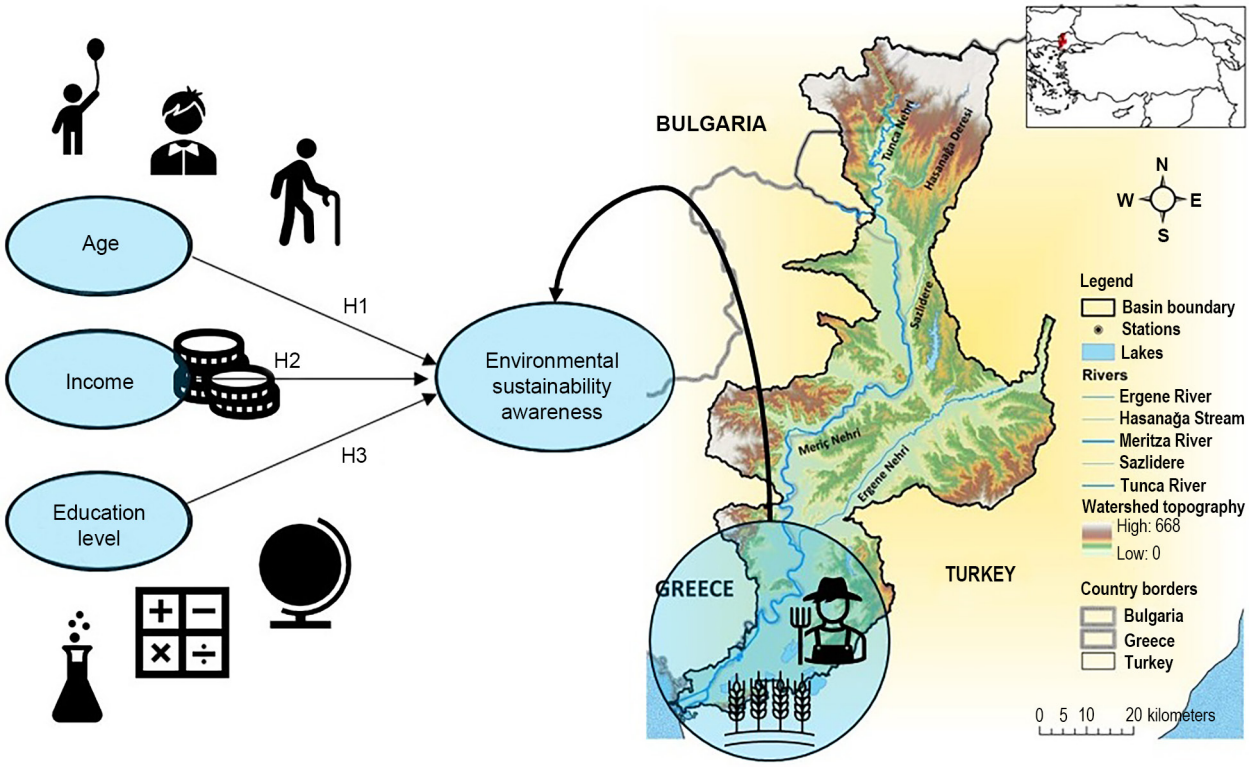


**Fig. 1.** Meriç River Basin and Meriç Plain (right) and the research model (left) (source: Authors' own elaboration)

**H3:** There is a significant difference between environmental sustainability awareness and education level in rice production.

To test the hypotheses of the research, a Likert-type scale ranging from 1 to 3 (1 = Disagree, 2 = Neutral, and 3 = Agree) was developed to measure environmental sustainability awareness. To evaluate the validity of the scale developed within the scope of the research, interviews were conducted with three experts in the field. As a result of these interviews, it was determined that the questions included in the scale could measure environmental sustainability awareness. To test the reliability of the scale, it was administered to two different groups (each consisting of 20 people) at ten-day intervals. The preliminary data obtained showed that the scale was reliable. Finally, the content validity of the scale was reassessed with a group of three experts, and this issue was clarified. Some erroneous statements in the scale were corrected, and the final version of the scale was made.

## RESULTS AND DISCUSSION

Findings regarding the demographic characteristics of the participants are presented in Figure 2. The questions posed to rice producers are presented in Table 1, while the results obtained through the quantitative data collection technique (frequencies of answers) are illustrated in Figure 3.

The reliability of a study refers to the degree to which a scale or test consistently and stably measures the concept it aims to measure. The more reliable a scale or test is, the more reliable the data obtained from it will be. Conversely, it is not possible for data obtained from an unreliable measurement tool to contribute scientifically. The reliability level ranges from 0 to 1, with a value approaching 1 indicating a high level of consistency (Coşkun et al., 2015). In our study, the "Cronbach Alpha" value for the "Environmental Sustainability Awareness" scale was calculated to be 0.803. This value indicates that the

scale is a consistent and reliable measurement tool. To determine whether the analysis method to be used in the study should be parametric or non-parametric, the normality of the obtained data was evaluated based on "Skewness-Kurtosis" values. According to the literature, the acceptable range for Skewness and Kurtosis coefficients is between –1.5 and +1.5 (Tabachnick and Fidell, 2013). It was found that the Skewness-Kurtosis coefficients of the scale used in our study fall within this range. Therefore, it was decided to test the hypotheses of the study using parametric analysis methods.

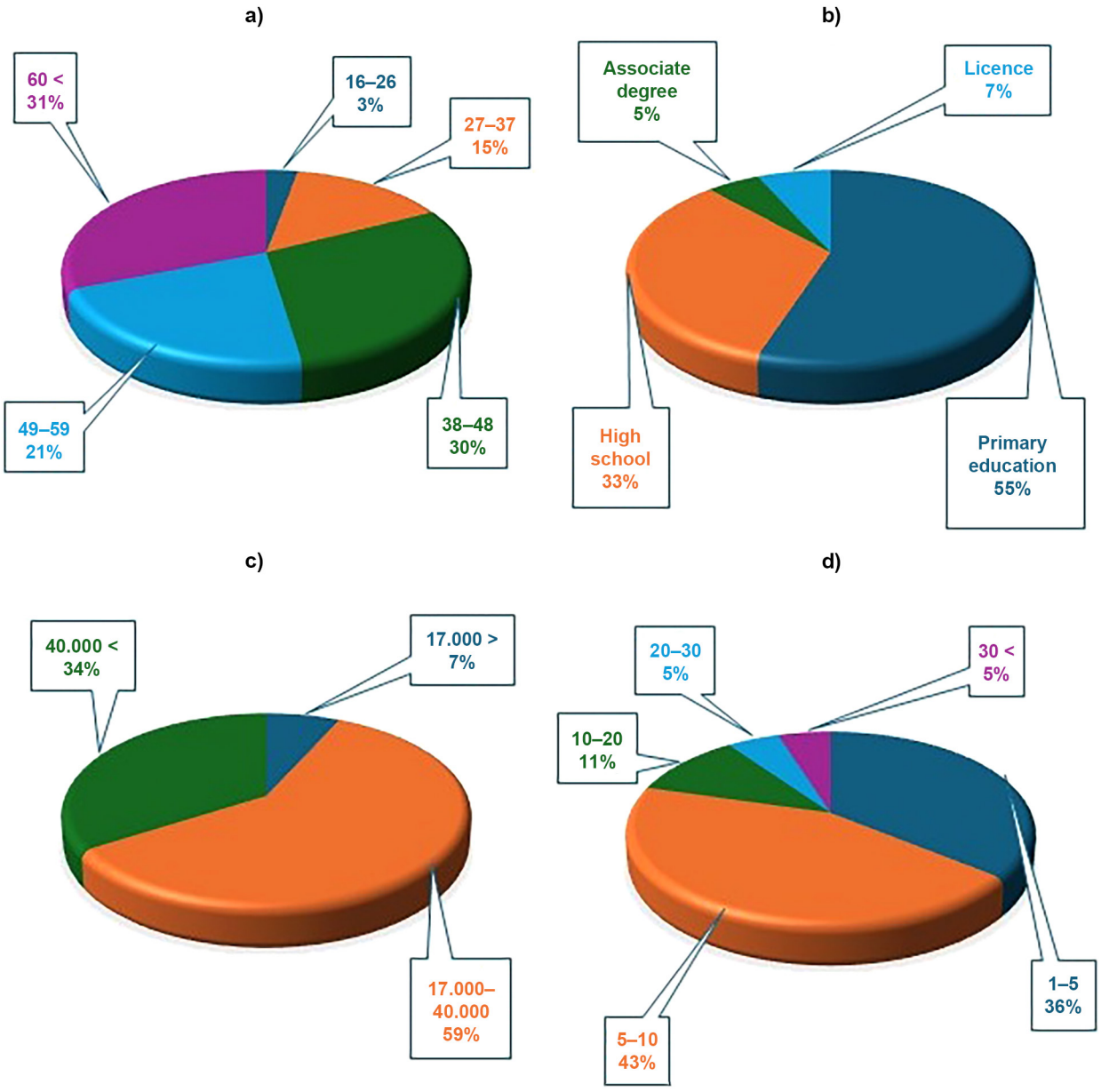


**Fig. 2.** Demographic characteristics of the participants: a) Age; b) Education; d) Monthly imcome (TL); d) Rice planting duration (years) (source: Authors' own elaboration)

**Table 1.** Questions directed to the rice producers (source: Authors' own elaboration)

| Questions | Question Code |
|---|---|
| One of the most important problems that threatens humanity today is environmental pollution | **Q1** |
| The rapid increase in the world population is one of the most important reasons for environmental pollution | **Q2** |
| Rapid developments in technology are one of the most important reasons for environmental pollution | **Q3** |
| Industry and its rapid advances are one of the most important reasons for environmental pollution | **Q4** |
| Unconscious agricultural activities significantly contribute to environmental pollution | **Q5** |
| Lack of sufficient environmental education is one of the most important reasons for environmental pollution | **Q6** |
| Ecological agricultural practices are beneficial for the environment and human health | **Q7** |
| Sufficient awareness-raising activities are being carried out in our region regarding environmental pollution | **Q8** |
| I do not think that burning stubble harms the environment too much | **Q9** |
| I do not think that spraying with airplanes harms the environment too much | **Q10** |
| Farmers in our region are sensitive enough to the environment and show the necessary sensitivity | **Q11** |
| Our people in the region are sensitive enough to the environment and show the necessary sensitivity | **Q12** |
| Planting the same crop every year weakens the soil and damages the environment | **Q13** |
| Planting the same crop every year causes more fertilizer and pesticide use | **Q14** |
| Excessive use of fertilizer and pesticide causes products to be unhealthy | **Q15** |
| There is a significant relationship between education level and environmental awareness | **Q16** |
| The environmental pollution problem in our region is greatly exaggerated | **Q17** |
| In our region, the measures and sanctions taken to protect the environment are sufficient | **Q18** |

To evaluate the structural validity of the developed scale, factor analysis was applied. One of the primary tests used to determine the suitability of any data set for factor analysis is the "Kaiser-Meyer-Olkin (KMO)" sample adequacy test. The KMO test is a statistical indicator that measures the suitability of a data set for factor analysis. According to the literature, a KMO value between 0.5 and 1.0 indicates that the data set is suitable for factor analysis, while values below 0.5 suggest that the data set is inadequate for factor analysis (Coşkun et al., 2015). In the factor analysis applied in our study, the factor loadings of the variables are given in Figure 3. Since the factor loading of Q12 was below 0.5 (0.330), it was excluded from the analyses. The KMO sample adequacy test result for the factor analysis was recorded as 0.752, indicating that it is sufficient for analysis. The factor loadings of all questions in the study are above 0.5 (except for Q12). This shows that the factor loadings are consistent, and the developed scale is valid in measuring environmental sustainability awareness.

Within the scope of the study, an ANOVA analysis was conducted to determine whether there is a significant difference between "environmental sustainability awareness" and "age," "monthly income," and "education level." The results obtained from the ANOVA analysis are presented in Table 2.

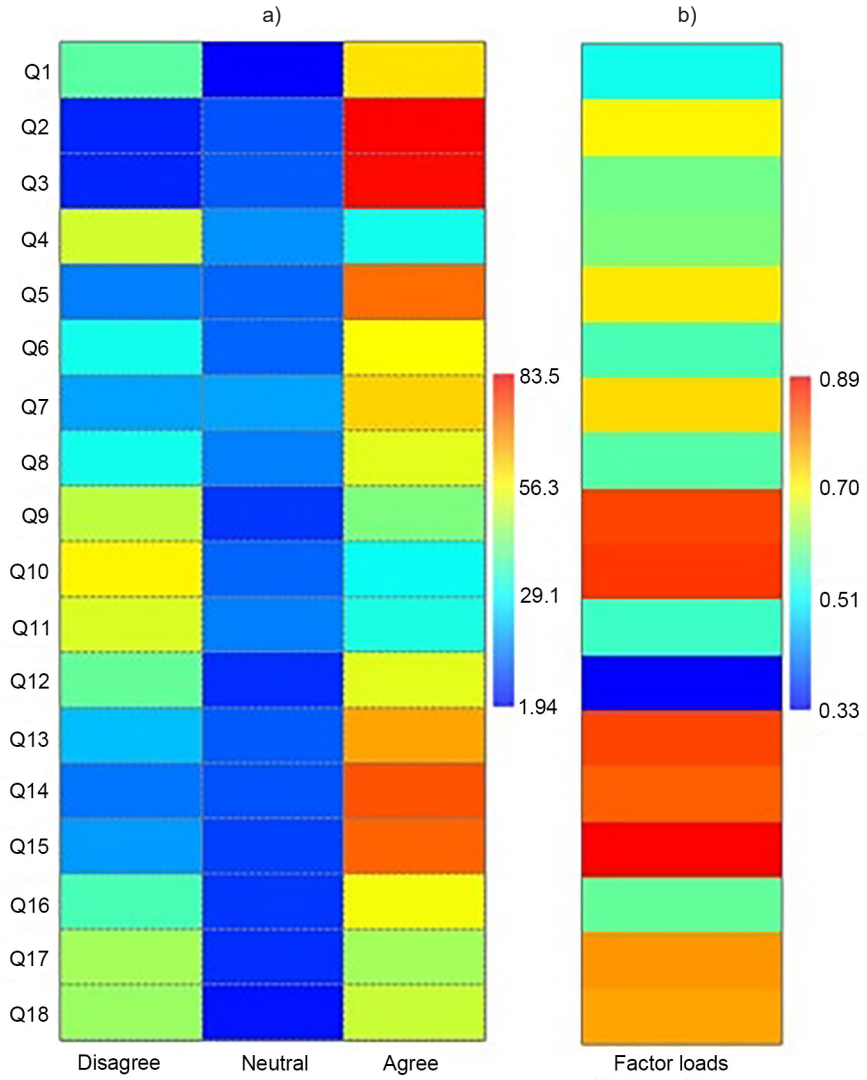


**Fig. 3.** Frequencies of the answers (a) and factor loads of variables (b) (source: Authors' own elaboration)

When evaluating the H1 hypothesis, since Sig = 0.449 > 0.05, it is seen that there is no significant difference between environmental sustainability awareness and the age groups of the participants. In other words, the environmental sustainability awareness of the participants does not vary according to age group. Therefore, the H1 hypothesis is rejected. When evaluating the H2 hypothesis, since Sig = 0.246 > 0.05, it is seen that there is no significant difference between environmental sustainability awareness and the monthly income of the participants. In other words, the environmental sustainability awareness of the participants does not vary according to income. Therefore, the H2 hypothesis is rejected. When evaluating the H3 hypothesis, since Sig = 0.014 < 0.05, it is seen that there is a significant difference between environmental sustainability awareness and the education level of the participants. In other words, the environmental sustainability awareness of the participants varies according to education level. Therefore, the H3 hypothesis is accepted.

Based on the results obtained, the H1 and H2 hypotheses were rejected, while the H3 hypothesis was accepted. According to the H3 hypothesis, to understand the relationship between environmental sustain-

**Table 2.** Model results for H1, H2 and H3 hypotheses (source: Authors' own elaboration)

| | Model | Sum of squares | df | Averages of squares | F | Sig. |
|---|---|---|---|---|---|---|
| **H1** | Regression | 117.139 | 4 | 29.285 | 0.932 | 0.449 |
| | Leftover | 3078.919 | 98 | 31.418 | | |
| | Sum | 3196.058 | 102 | | | |
| **H2** | Regression | 88.389 | 2 | 44.194 | 1.422 | 0.246 |
| | Leftover | 3107.669 | 100 | 31.077 | | |
| | Sum | 3196.058 | 102 | | | |
| **H3** | Regression | 328.429 | 3 | 109.476 | 3.741 | 0.014 |
| | Leftover | 2867.532 | 98 | 29.261 | | |
| | Sum | 3195.961 | 101 | | | |

a. Dependent variable: Environmental sustainability awareness
H1 b. Independent variables: Age
H2 b. Independent variables: Income level
H3 b. Independent variables: Educational status

ability awareness and education level groups, a "Homogeneity of Variance" test was applied to determine whether the variances were homogeneously distributed. It was observed that the variances for both scales were not homogeneously distributed. The values related to the "Tamhane" test, one of the "Post-Hoc" tests conducted when variances do not show normal distribution, are presented in Table 3.

According to the results of the analysis, significant relationships were recorded between education levels and environmental sustainability awareness. Specifically, it was determined that the primary education group has significantly lower environmental awareness compared to the high school, associate's degree, and bachelor's degree groups (Sig. < 0.05). However, no significant difference was found between the high school, associate's degree, and bachelor's degree groups (Sig. > 0.05). These results indicate that as the education level increases, environmental sustainability awareness statistically significantly increases. Notably, the primary education group's environmental sustainability awareness is significantly lower than all other education groups. However, the lack of significant difference between the high school, associate's degree, and bachelor's degree groups suggests that environmental awareness remains at a stable level after a certain education level.

Environmental awareness is a critical component of contemporary environmental management and sustainability efforts. Various socio-demographic factors, including education, age, income, and profession, significantly influence individuals' environmental awareness levels. Education is consistently identified as a pivotal factor influencing environmental awareness. Higher levels of education correlate with increased environmental knowledge and concern, as educated individuals tend to value stricter environmental regulations and are more likely to engage in pro-environmental behaviours (Bréchet and Prieur, 2013).

Education serves as the primary line of defence in fostering environmental awareness. Teachers who are particularly well-prepared regarding the environment and ecology, and who can explain the subject to students in an engaging way by using up-to-date research data, can significantly influence the environmental attitudes of future generations (Patonah and Rahardjo, 2017). Furthermore, studies indicate that environmental education enhances not only knowledge but also the motivation to act on environmental issues, thereby fostering a more environmentally conscious citizenry (Edsand and Broich, 2019; Çabuk, 2023).

As similar to the current research data, scientific research conducted across various regions of the world and among diverse demographic groups consistently

**Table 3.** Multiple comparisons of education levels (source: Authors' own elaboration)

| Education level | Education level | Mean difference | Std. error | Sig. | 95% Confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower bound | Upper bound |
| Primary education | High school | **3.09286*** | 1.09873 | .035 | .1364 | 6.0494 |
| | Associate degree | **4.29286*** | 1.04976 | .002 | 1.3268 | 7.2589 |
| | Licence | **4.75000*** | 1.13411 | .002 | 1.5391 | 7.9609 |
| High school | Primary education | –3.09286* | 1.09873 | .035 | –6.0494 | –.1364 |
| | Associate degree | 1.20000 | .90841 | .745 | –1.4905 | 3.8905 |
| | Licence | 1.65714 | 1.00470 | .523 | –1.3041 | 4.6184 |
| Associate's degree | Primary education | **–4.29286*** | 1.04976 | .002 | –7.2589 | –1.3268 |
| | High school | –1.20000 | .90841 | .745 | –3.8905 | 1.4905 |
| | Licence | .45714 | .95090 | .998 | –2.6469 | 3.5612 |
| Bachelor's degree | Primary education | **–4.75000*** | 1.13411 | .002 | –7.9609 | –1.5391 |
| | High school | –1.65714 | 1.00470 | .523 | –4.6184 | 1.3041 |
| | Associate degree | –.45714 | .95090 | .998 | –3.5612 | 2.6469 |

* The mean difference is significant at the 0.05 level

demonstrates a significant correlation between environmental awareness and education levels (Yeşilyurt et al., 2020; Niu et al., 2022; Yang et al., 2022). These studies reveal that as the level of education increases, there is a marked and statistically significant enhancement in both environmental awareness and sensitivity. This relationship underscores the critical role of education in fostering a deeper understanding of environmental issues and promoting proactive environmental stewardship. The findings suggest that individuals with higher educational attainment are more likely to possess a heightened awareness of environmental challenges and exhibit greater sensitivity towards sustainable practices. This trend is evident across different cultural and geographical contexts, indicating a universal pattern. The implications of these results are profound, highlighting the necessity of integrating comprehensive environmental education into curricula at all levels of the educational system.

Research indicates that targeted environmental education campaigns can effectively raise awareness among vulnerable groups, such as high school students with limited access to climate information (Libelo and Tracy, 2022). Similarly, findings by Torres (2023) reveal that educational initiatives designed for specific demographic groups can promote environmental consciousness and responsible behaviours. Zhongbin (2024) emphasizes that incorporating environmental themes within art education not only enhances awareness but also encourages collective action to address environmental challenges. These findings align with Çabuk's (2023) studies, which state that environmental education equips individuals with the necessary knowledge and skills to tackle environmental issues. Lee's (2023) research demonstrates that inquiry-based and teacher-guided science instruction significantly increases students' awareness of environmental issues, thereby enhancing their self-efficacy in science. Additionally, Torres' (2023) study on university students shows that educational initiatives focusing on regional environmental problems increase awareness and eco-friendly behaviours. Karimzadegan and Meiboudi's (2014) research indicates that environmental education for preschool children can effectively enhance their environmental knowledge. Similarly, Gül and Özdemir's (2022) study reveals that education at all school levels improves children's environmental awareness.

In conclusion, socio-demographic factors, particularly education, play a pivotal role in shaping environmental awareness. Consistent with similar studies conducted globally, the data obtained in our current research unequivocally illustrate the strong correlation between education and environmental consciousness. Comprehending the factors influencing environmental awareness, especially education, is essential for the development of effective environmental education programs and policies aimed at enhancing public awareness and engagement in environmental issues.

## CONCLUSION

This study aimed to evaluate the environmental sustainability awareness of rice farmers in the Meriç Plain. The findings revealed that participants' environmental sustainability awareness is not significantly affected by demographic factors such as age and monthly income. However, there is a statistically significant relationship with education level. Comparisons based on education level showed that participants with primary education have significantly lower environmental awareness compared to other groups, while no significant difference was found between high school, associate degree, and bachelor's degree groups. These results indicate that environmental awareness becomes more stable and reaches a plateau after a certain level of education.

The research results clearly highlight the importance of education level in increasing environmental sustainability awareness. Based on the data obtained, it is recommended to develop special education and awareness programs aimed at enhancing environmental awareness among individuals with lower education levels. Additionally, these results serve as an important guide for policymakers and relevant institutions and should be considered in the formulation of agricultural policies focused on environmental awareness. Future studies can further enrich the literature in this field by examining other variables that may affect environmental sustainability awareness.

Based on the research findings, the following recommendations can be made:

1. Education and awareness programs: Organize educational programs and awareness campaigns aimed at increasing environmental sustainability awareness among individuals with primary education. These programs should focus on teaching basic environmental knowledge and promote environmentally friendly agricultural practices.
2. Sustainable agriculture and marketing practices: Policies aimed at increasing environmental sustainability awareness can be supported by sustainable marketing approaches. Sustainable marketing can encourage the adoption of environmentally friendly practices in agriculture by balancing environmental, social, and economic factors. Long-term strategies that provide both environmental and economic benefits to farmers should be developed.
3. Integration of sustainability goals into business models: Rice producers can adopt environmentally conscious production methods by integrating sustainability goals into their business models. Sustainable marketing strategies can promote such eco-friendly practices and shape consumer behaviour to develop sustainable consumption habits.
4. Considering environmental costs in agricultural production processes: Within the framework of sustainable marketing, all environmental costs in production and consumption processes should be considered. This approach supports long-term value creation while helping to protect natural resources and reduce the negative environmental impacts of agricultural production.
5. Farmer-consumer communication and education campaigns: To increase consumers' environmental sustainability awareness, direct communication channels can be established with farmers. This approach not only increases transparency in the production process but also supports consumers' environmental sensitivity.
6. Incorporating the European Green Deal into agricultural strategies: The European Green Deal, with its emphasis on sustainable agriculture and environmental protection, provides a valuable framework for enhancing environmental sustainability practices among rice farmers. Policies and initiatives aligned with the Green Deal can encourage farmers to adopt practices that comply with international sustainability standards. Training programs should emphasize the goals of the Green Deal, such as reducing greenhouse gas

emissions, minimizing chemical usage, and promoting biodiversity. This approach ensures alignment with global sustainability goals and enhances the competitiveness of agricultural products in international markets.

## REFERENCES

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö.E., Karadeniz, Ş., Demirel, F. (2013). Bilimsel Araştırma Yöntemleri. Ankara: Pegem Akademi Yay. Eğt. Dan. Hizm. Tic. Ltd. Şti.

Bréchet, T., Prieur, F. (2013). Can education be good for both growth and the environment? Macroeconomic Dynamics, 17 (5), 1135–1157. DOI: 10.1017/S1365100512000132

Çabuk, F. (2023). The effect of environmental awareness education program on children's environmental awareness. Journal of Humanities and Social Sciences, 6 (education special issue), 379–400. DOI: 10.53048/johass.1358178

Coşkun, R., Altunışık, R., Bayraktaroğlu, S., Yıldırım, E. (2015). Sosyal bilimlerde araştirma yöntemleri, İstanbul: Sakarya Kitap Evi.

Edsand, H., Broich, T. (2019). The impact of environmental education on environmental and renewable energy technology awareness: Empirical evidence from Colombia. International Journal of Science and Mathematics Education, 18 (4), 611–634. DOI: 10.1007/s10763-019-09988-x

Gül, A., Özdemir, N. (2022). Investigation of Turkish elementary school students' environmental awareness. Education Quarterly Reviews, 5 (4), 1–14. DOI: 10.31014/aior.1993.05.04.601

Karimzadegan, H., Meiboudi, H. (2014). Effectiveness of environmental education on environmental knowledge of kindergarten children in Rasht city. Journal of Environmentally Friendly Processes, 1 (4), DOI: 10.14266/jefp14-2

Lee, A. (2023). The importance of cultivating awareness of environmental matters in science classrooms: A cross-regional study. Australian Journal of Environmental Education, 39 (4), 467–491. DOI: 10.1017/aee.2023.7

Libelo, H., Tracy, S. (2022). Establishing a relationship between demographic factors and students' environmental awareness. Journal of Student Research, 11 (1), 1–12. DOI: 10.47611/jsrhs.v11i1.2282

Ministry of Agriculture and Forestry (2023). Turkey's rice production and variety development. https://www.tarimorman.gov.tr (accessed: February 18, 2025).

Niu, Y., Wang, X., Lin, C. (2022). A study on the impact of organizing environmental awareness and education on the performance of environmental governance in China. International Journal of Environmental Research and Public Health, 19, 12852. DOI: 10.3390/ijerph191912852

Patonah, S., Rahardjo, S.B. (2017). The environmental awareness profile of elementary school pre-services teacher. Advances in Social Science, Education and Humanities Research, 158. DOI: 10.2991/ictte-17.2017.97

Tabachnick, B.G., Fidell, L.S. (2013). Using multivariate statistics. Pearson: Boston.

Tokatlı, C. (2015). Assessment of the water quality in the Meriç River: As an element of the ecosystem in the Thrace Region of Turkey. Polish Journal of Environmental Studies, 24 (5), 2205–2211. DOI: 10.15244/pjoes/58780

Tokatlı, C. (2019). Sediment quality of Ergene River Basin: Bio-ecological risk assessment of toxic metals. Environmental Monitoring and Assessment, 191 (11), 1–12. DOI: 10.1007/s10661-019-7885-2

Tokatlı, C. (2020). Pesticide residues in water and sediment of Ergene River and tributaries in Turkey. Sigma Journal of Engineering and Natural Sciences, 38 (1), 361–370.

Tokatlı, C., Islam, A.R.T. (2023). Spatial-temporal distributions, probable health risks and source identification of organic pollutants in surface waters of an extremely hypoxic river basin in Türkiye. Environmental Monitoring and Assessment, 195, 435. DOI: 10.1007/s10661-023--11042-x

Tokatlı, C., Solak, C.N., Yılmaz, E. (2020). Water quality assessment by means of bio-indication: A case study of Ergene River using biological diatom index. Aquatic Sciences and Engineering, 35 (2), 43–51. DOI: 10.26650/ASE2020646725

Tokatlı, C., Ustaoğlu, F. (2020). Health risk assessment of toxicants in Meriç River Delta Wetland, Thrace Region, Turkey. Environmental Earth Science, 79, 426. DOI: 10.1007/s12665-020-09171-4

Tokatlı, C., Varol, M. (2021). Impact of the covid-19 lockdown period on surface water quality in the Meriç--Ergene River Basin, Northwest Turkey. Environmental Research, 197, 111051. DOI: 10.1016/j.envres.2021.111051

Torres, A. (2023). Environmental connection, awareness, and behaviours in university students: An exploratory Portuguese study. Sustainability, 15 (18), 13763. DOI: 10.3390/su151813763

Turkish Seed Union (TÜRKTOB) (2023). History of rice and paddy production. https://www.turktob.org.tr (accessed: February 18, 2025).

Turkish Statistical Institute (TÜİK) (2023). Agricultural production statistics. https://www.tuik.gov.tr (accessed: February 18, 2025).

Yang, B., Wu, N., Tong, Z., Sun, Y. (2022). Narrative-based environmental education improves environmental awareness and environmental attitudes in Children aged 6–8. International Journal of Environmental Research and Public Health, 19, 6483. DOI: 10.3390/ijerph19116483

Yeşilyurt, M., Balakoğlu, M.Ö., Erol, M. (2020). The impact of environmental education activities on primary school students' environmental awareness and visual expressions. Qualitative Research in Education, 9 (2), 188–216. DOI: 10.17583/qre.2020.5115

Yoşumaz, İ., Uzun, H. (2024). The relationship between industry 5.0 Process and ESG process: A qualitative analysis in the context of Türkiye's BIST Sustainability 25 Index white good sector. Environmental Research and Technology, 7 (4), 512–529. DOI: 10.35208/ert.1431800

Zhongbin, Z. (2024). Innovative approaches to art education by integrating environmental awareness in art curriculum in Beijing. International Journal of Academic Research in Progressive Education and Development, 13 (1), 2075–2082. DOI: 10.6007/IJARPED/v13-i1/20657

## ABSTRAKT

### OCENA ŚWIADOMOŚCI EKOLOGICZNEJ PRODUCENTÓW RYŻU W DOLINIE MERIÇ (PÓŁNOCNO-ZACHODNIA TURCJA). KOMPLEKSOWE PODEJŚCIE STATYSTYCZNE

**Cel pracy**
Dolina Meriç, kluczowy region rolniczy znany jako „kraina ryżu" w Turcji, jest największym obszarem uprawy ryżu w kraju. Niniejsze badanie analizuje świadomość ekologiczną rolników uprawiających ryż w tym regionie.

**Materiał i metody**
Dane to odpowiedzi pozyskane od 103 rolników przy użyciu metody doboru wygodnego, które przeanalizowano za pomocą oprogramowania SPSS 27.

**Wyniki i wnioski**
Wykazano, że na poziom świadomości ekologicznej znaczącego wpływu nie mają czynniki demograficzne, takie jak wiek czy dochód. Natomiast poziom wykształcenia ma pozytywny wpływ. Rolnicy jedynie z wykształceniem podstawowym wykazywali znacząco niższą świadomość w porównaniu do tych z wyższym wykształceniem. Nie zaobserwowano istotnych różnic między osobami z maturą, dyplomem technika czy licencjatem, co wskazuje, że świadomość stabilizuje się po osiągnięciu określonego poziomu edukacji.

**Słowa kluczowe:** dolina Meriç, producenci ryżu, świadomość ekologiczna, ocena statystyczna