


Opinions and Perceptions on Sustainable Weed Management: A Comparison between Greek and Tunisian Farmers [†]

Efstratios Michalis ^{1,*}, Ahmed Yangui ², Athanasios Ragkos ¹, Mohamed Kharrat ³
and Dimosthenis Chachalis ⁴

¹ Agricultural Economics Research Institute, Hellenic Agricultural Organization (ELGO-DIMITRA), Kourtidou 56-58, 111 45 Athens, Greece; ragkos@elgo.gr

² Agricultural Economic Laboratory (LER), National Institute of Agronomic Research of Tunisia (INRAT), University of Carthage, Ariana 1004, Tunisia; yangui.ahmed@gmail.com

³ Field Crop Laboratory (LGC), National Institute of Agronomic Research of Tunisia (INRAT), University of Carthage, Ariana 1004, Tunisia; kharrat.mohamed@inrat.ucar.tn

⁴ Laboratory of Weed Science, Benaki Phytopathological Institute, Stefanou Delta 8, Kifisia, 145 61 Athens, Greece; d.chachalis@bpi.gr

* Correspondence: efstratiomichalis@gmail.com

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Abstract: Societal awareness, demand for innovative food systems and increasing herbicide resistance have induced policy, regulatory and research actions towards the adoption of sustainable weed management, which is based on sustainable, integrated and ecological principles. The study investigates farmers' perceptions with regard to sustainable weed management, considering that the adoption of relevant practices depends on a set of farmer-specific and innovation-specific attributes. To achieve this purpose, an on-site survey was conducted in Greece and Tunisia based on a structured questionnaire, which was completed by 105 arable farmers in total. The questionnaire was designed to record farmers' opinions and preferences regarding aspects related to sustainable weed management, such as innovation and the decision making process. Using descriptive statistics methods, the study pinpointed significant differences between the responses of Greek and Tunisian farmers due to their particular needs and characteristics, suggesting thus the integration of targeted approaches towards the expansion of sustainable weed management.

Keywords: weeds; questionnaire survey; innovation; decision making



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1. Introduction

Weeds constitute the most important biotic constraints to agricultural production in both developing and developed countries [1], as they compete with crops, leading to the overuse of natural resources and agricultural inputs. The reduction in crop productivity due to weeds is a major issue related to food security, taking into account the rapidly growing human population worldwide.

At the same time, herbicide resistance—due to misuse or overuse of chemical herbicides [2]—is considered one of the most serious challenges associated with weed management, as, by November 2018, resistance to herbicides had been reported in 255 weed species in 70 countries [3].

All these challenges have induced policy, regulatory and research actions towards sustainable weed management practices, which, however, are not always accepted and their adoption depends on a combination of farmer-specific and innovation-specific attributes.

The purpose of the study is to shed light on how farmers from two Mediterranean countries (Greece and Tunisia) perceive aspects related to sustainable weed management. Using descriptive statistics methods, the study showed that responses vary significantly between Greek and Tunisian farmers, especially in terms of their decision making.

2. Methods

2.1. Survey Profile

The study presents the results of an on-site survey of farmers—specialized in the cultivation of annual arable crops—in typical rural areas of Greece and Tunisia. For the purpose of the main analysis, a structured questionnaire comprising two parts was developed to record the perceptions, attitudes, motivations and aspirations of farmers in both countries regarding sustainable weed management. The first part of the questionnaire, as shown in Table 1, recorded the personal profile of the respondent (gender, age, education level). In the second part, participants were asked to respond to different sets of questions—using a 5-point Likert-scale ranging from 1 (=Totally disagree/Never) to 5 (=Totally agree/Very often)—aiming to evaluate their attitudes towards innovation and sustainable weed management practices. In total, 105 farmers were interviewed in Greece and Tunisia from June 2021 to August 2022.

Table 1. Respondents’ profiles.

Variable	Frequency	Percentage (%)
Region		
Greece	61	58.1
Tunisia	44	41.9
Gender		
Male	99	94.3
Female	6	5.7
Age		
20–29	12	11.4
30–39	22	21.0
40–49	24	22.9
50–59	29	27.6
>60	18	17.1
Education		
Primary education	24	22.9
Secondary education	40	38.1
Technical graduate school	21	20.0
University education	20	19.0

2.2. Methodological Background

The methodological approach used to analyze the categorical (ordinal) data in this study involved a descriptive analysis of responses, aiming to acquire a general viewpoint of interviewees’ opinions and attitudes. The Mann–Whitney non-parametric test was used to determine the level of significance of the differences between the responses provided by Greek and Tunisian farmers. This test can be applied for the ordinal data of two independent groups, without a normality assumption, to examine whether one variable has a higher value than the other [4]. The analysis in this study was performed with the statistical package SPSS, version 24.

3. Results and Discussion

Table 2 summarizes farmers’ perceptions on innovations in agriculture. It seems that their beneficial role was acknowledged by respondents. In particular, the necessity of innovations received the highest attention, followed by their contribution to increasing farm productivity, their support to food security, their ability to improve standards of living as well as their conduciveness to the production of high-quality products. On the other hand, respondents were neutral regarding the contribution of innovations to environmental protection and about the guaranteed result of their application. Differences between Greek and Tunisian farmers were found with regard to the complicated use of innovations and

the degree to which they are subsidized by the State. Especially for the latter, Greek farmers were significantly more negative.

Table 2. Respondents’ perceptions regarding innovations in agriculture.

	Means		Medians	
	Greece	Tunisia	Greece	Tunisia
Innovations are necessary	4.29	4.45	4.00	5.00
Innovations are expensive	3.96	3.70	4.00	4.00
Innovations require training and specific knowledge	4.04	4.11	4.00	4.00
The use of innovations is complicated **	2.93	3.47	3.00	4.00
Innovations improve standards of living	3.86	3.93	4.00	4.00
Innovations increase farm productivity	4.11	3.88	4.00	4.00
The result of innovations is not guaranteed	3.27	2.88	3.00	3.00
Innovations are adequately subsidized by the State **	2.83	4.15	3.00	5.00
Young farmers tend to adopt innovations more easily	3.11	3.11	3.00	3.00
Innovations contribute to the production of high-quality products	3.88	3.86	4.00	4.00
Innovations contribute to environmental protection *	3.22	2.61	3.00	3.00
Innovations contribute to food security	3.98	3.75	4.00	4.00

* indicates significant difference between the medians of Greek and Tunisian farmers at the 5% level. ** indicates significant difference between the medians of Greek and Tunisian farmers at the 1% level.

Table 3 presents the means and medians of items describing sources of information based on which farmers make decisions regarding weed management. The vast majority of respondents make such decisions based on their own knowledge and expertise, which received by far the highest score. In contrast, training courses and seminars, public services, universities and research institutes, internet and other mass media were considered unreliable sources by farmers. Here, discrepancies between the responses of Greek and Tunisian farmers were notable in more items compared to their perceptions on innovations in agriculture. Greek farmers consulted other farmers, members of their family, internet as well as private advisors and agronomists more often than Tunisians. Finally, farmers from both countries ignored the role of public services, but Greeks did so to a higher degree.

Table 3. Respondents’ decision making regarding weed management practices.

	Means		Medians	
	Greece	Tunisia	Greece	Tunisia
Based on my knowledge and expertise	4.55	4.65	5.00	5.00
I ask other farmers I trust **	2.75	1.84	3.00	2.00
I ask members of my family **	3.36	1.77	4.00	2.00
I attend training courses and seminars	1.70	1.65	2.00	2.00
Private advisors—Consultants/Agronomists **	3.85	1.47	4.00	1.00
Public services *	1.18	1.59	1.00	1.00
University/Research Institute *	1.60	1.31	1.00	1.00
Internet **	2.26	1.59	2.00	1.00
TV/Radio shows/Mass media/Books/Magazines *	1.60	1.25	1.00	1.00

* indicates significant difference between the medians of Greek and Tunisian farmers at the 5% level. ** indicates significant difference between the medians of Greek and Tunisian farmers at the 1% level.

4. Conclusions

The need to shift towards sustainable and environmentally friendly practices that can also ensure effective weed control is constantly gaining attention. Innovative practices, however, are not always accepted by farmers, as an outcome of their specific characteristics and requirements. The study detected significant differences between the responses of Greek and Tunisian farmers regarding innovations in agriculture and especially regarding their decision making about weed management.

These findings present orientations for strategic and policy design towards the expansion of sustainable weed management, taking into account that the diverse socio-economic profiles of farmers and their different attitudes towards innovation require targeted approaches.

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