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Assessing Farmers' Willingness to Pay for Adopting Sustainable Corn Traits: A Choice Experiment in Italy

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Abstract: Corn is a major staple crop known for its nutritional value and versatility in industrial applications. Climate change threatens sustainable production, making understanding farmers' preferences and willingness to pay (WTP) for desirable traits crucial in seed selection. This study employs the Choice Experiment (CE) to assess the importance of key attributes, including yield potential, disease resistance, yield under water stress conditions, and price. The evaluation was conducted in Italy on a sample of 31 producers in the Lombardy region, where corn cultivation occupies 50% of the arable land, and the national annual volume equals about 11 million tons. Results indicate that yield under water stress conditions is the most critical attribute reflecting the need for high productivity to cope with yield fluctuations and production costs induced by climate change. The significance of this study lies in its ability to provide insights into farmers' preferences and their priorities for maize seed attributes, which in turn offer invaluable decision support to seed breeding programs. This contribution not only promotes the development of improved corn traits and varieties for sustainable production and global food security but also guides resilient investment decisions and effective marketing strategies.

Keywords: choice experiment; willingness to pay; corn; seed; attributes; farmer preferences

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1. Introduction

Corn (*Zea mays* L.), as a major staple crop, is known for its efficient resource use, substantial nutritional energy, high biomass generation per hectare, responsiveness to breeding and genetic modification, and versatility across multiple economic sectors [1]. It plays a primary role in Italy, especially in the Lombardy region, where one-quarter of the total area and national production (six million tons) are present [2]. Climate change exerts a growing negative impact on the agricultural sector by stimulating continuous research for resilient solutions to biotic and abiotic stresses [3]. Therefore, understanding farmers' preferences and willingness to pay (WTP) a premium price for desirable characteristics is crucial to ensure sustainable production [4].

The significance of understanding farmers' preferences related to specific crop characteristics is underscored by the multitude of studies currently found in the literature. For example, an in-depth examination of preferences for characteristics among small rice farmers in the Philippines has been conducted. Overall, it emerged that farmers demonstrated a greater commitment to promoting improvements in rice varietal traits that could mitigate losses due to lodging, insect infestations, and diseases [5]. Similarly, attention has been directed towards preferences regarding distinctive traits among farmers engaged in wheat cultivation in central India. Among the distinct traits considered, the most relevant variable, namely chapati quality, was included as a fundamental component in the selection experiment, being universally recognized as pivotal in the decision-making process. Following the consideration of quality, farmers ranked traits associated with higher yield, such as plant height and the number of tillers per plant, with a higher priority than traits that could mitigate risks, such as drought tolerance, lodging, and disease resistance [6]. Another study revealed that sorghum yield had been significantly compromised by periodic drought conditions, striga infestations, and disease-related issues. Consequently, a substantial majority of interviewed farmers suggested that the sorghum breeding program should aim to develop varieties with high grain and biomass yield, along with an appropriate level of drought resistance and striga tolerance [7].

However, it is worth noting that despite the various studies in this field, none have specifically focused on maize. Studies concerning maize are limited and thus exhibit significant gaps that warrant attention in further investigations. Some studies have investigated WTP for corn crop traits using the Choice Experiment (CE) [8], including the most recent by Marenya et al. (2022) [9] that explored WTP of smallholders in Ethiopia to sacrifice yield for specific traits such as drought tolerance and plant architecture; however, this study did not encompass all social and economic factors influencing variety choices. The large sample (1499 respondents) includes old smallholders, showcasing a preference for a more traditional approach. As a developing country, Ethiopia faces challenges related to subsistence farming and smaller farm sizes, while Italy has mechanized agriculture and larger farms. It is essential to assess the profile of the farmer and the company as it has been shown how this can influence the outcome of the research [9]. The comparison of the study conducted in Ethiopia with the present study in Italy could provide valuable insights for improving agricultural productivity, food security, and environmental sustainability in different contexts. Silberg et al. (2020) [10] investigated the preferences and trade-offs made by smallholders in Malawi on adopting intercropping practices to counteract striga, a parasitic weed that significantly affects yields in southern Africa. The geographic specificity of the study does not represent farmers' preferences in Italy. Birol et al. (2009) [11] evaluated agrobiodiversity components, including crop species richness, corn variety richness, and traditional landraces, within the milpa system in Mexico. The research's main limit is that it investigates only farmers' interest in cultivating genetically modified (GM);therefore, the present study considers sustainable maize traits in general, allowing for a comparison with the current market and providing valuable insights into how sustainable maize traits are valued concerning existing maize varieties available to farmers. Focusing on the preferences and needs of farmers in Chiapas (Mexico), Sánchez-Toledano et al. (2017) [12] identified the WTP as a critical factor in the selection of 'improved seed' varieties and landraces useful in the development of target appropriate technologies. However, the study does not provide information on data collection methods and the selection process defining the attribute levels. Moreover, the term "improved seed" is not clearly defined, leaving a lack of clarity regarding these varieties' specific characteristics or traits. In conclusion, studies analyzing WTP towards specific corn crop traits often have some gaps and limitations, which should be overcome by additional studies. Currently, there are no studies analyzing the preference of Italian farmers.

Despite the evident advantages and the potential benefits that improved corn varieties can offer to both farmers and the agricultural sector, the full potential of these advancements is not totally exploited. The gap between the availability of enhanced maize traits and their adoption in real-world agricultural practices is a critical challenge. Factors such as lack of awareness, limited access to information, economic constraints, and ingrained farming practices can hinder the widespread adoption of improved varieties [9]. Even when farmers are aware of these advanced traits, barriers such as initial investment costs, uncertainties about performance, and the need for tailored agronomic practices discourage farmers from adopting these innovations [11].

Based on the state of the art and intending to exceed the limitations found in currently available studies and guarantee the broadest model replicability in different climatic conditions, the present study aims to analyze the preferences of Italian corn farmers towards estimating the relevance and the WTP for specific attributes (yield, yield under water stress conditions, disease resistance, price) in the decision-making process. The selection of attributes was carried out through a preliminary pilot study to reduce bias and assess the quality of the questions. The sample was characterized according to multiple variables to comprehensively understand the interviewees' characteristics, a crucial aspect in influencing the analysis and interpretation of the findings.

The results from the questionnaire responses were analyzed using the Random Utility Maximization (RUM) model and the Conditional Logit Model. The RUM model provides a theoretical framework for understanding the decision-making process of participants in the CE, while the Conditional Logit Model is a statistical tool used to estimate coefficients and analyze the collected data within the context of the CE [13]. As a result, the RUM and Conditional Logit Model are complementary and contribute to a deeper understanding of individuals' preferences and the role of attributes in shaping their choices.

The focus of this research on the tendency of corn farmers towards specific maize characteristics is a relatively unexplored area of study, as—even if studies analyze consumers' WTP for more sustainable food products—there is a lack of information about the motivations guiding cultivators in their decisions to adopt specific maize traits, such as drought resistance, yield under water stress conditions, and other desirable properties. This research aims to fill this gap by providing an in-depth analysis of maize cultivators' preferences and the variables influencing their inclination to consider specific maize characteristics. Furthermore, the article analyzes the underlying adoption barriers that hinder the effective integration of improved maize varieties into practical farming systems to bridge the gap between the potential benefits of these enhanced corn traits and their actual implementation.

This research provides valuable insights that can guide policymakers, researchers, and agricultural stakeholders towards collaboration to create an optimal environment for the introduction and utilization of these improved traits, contributing to the development of more sustainable, productive, and resilient agricultural practices.

The methodology used in this article supports investment decisions, resource allocation, product development, research prioritization, effective marketing strategies, and regional policy recommendations. The WTP insights about market dynamics, forecasting, and supply chain management ensure consistency between corn production and consumer preferences.

2. Materials and Methods

2.1. The Choice Experiment (CE) Model

CE is a widely used evaluation method in social, economic, and environmental sciences to measure individuals' preferences towards a good or service and assess the value given to different features or attributes. Based on the concept of utility compensation by evaluating various options [8], it consists of different *choice sets* (*scenarios*), statistically designed, and characterized by two or more exclusive *alternatives* (*options*). The number of options in a choice set is called the *Choice set size* [14], and each option describes the good to be evaluated through its salient features (*attributes*), expressed with different degrees (*levels*) [15] (Figure 1). A sample of respondents (also called subjects) is asked to choose one of the options presented in each scenario which are differentiated in terms of their attributes and levels [15]. The CE can estimate the WTP as the maximum amount for a good or service with specific attributes, which helps companies to make pricing decisions or optimize product features [8].

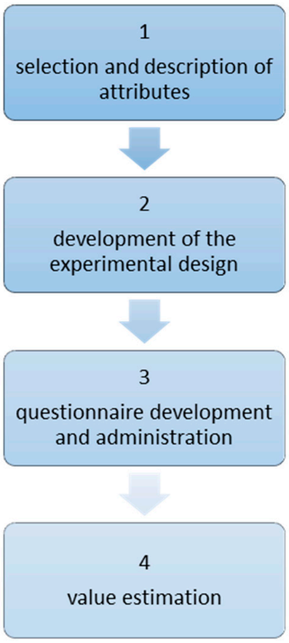

Figure 1. Stages for the construction of the Choice Experiment.

2.2. Model Identification

2.2.1. Literature Analysis

An in-depth literature analysis was conducted to identify the most crucial attributes for farmers when purchasing seeds, focusing on crop yield, drought tolerance, disease resistance, and price. Articles, reviews, textbook chapters, and recent publications from 2015 to 2023, emphasizing the last three years (2020–2023), were analyzed through public databases, including Google Scholar and Elsevier. Specific keywords were selected to refine the research on yield, drought tolerance, and disease resistance.

2.2.2. Sample Definition

A sample of 31 Lombard farmers was considered based on data available in the Italian Chambers of Commerce by refining the research based on the NACE code for mixed farming 01.50.00, the keyword "maize", and within the Lombardy region [16]. Selected companies were contacted via emails and phone calls. The sample was characterized according to sociodemographic variables (i.e., gender, age, educational level), professional variables (i.e., role in the company and years of experience), and company variables (i.e., farm size, type of varieties cultivated, final application (food, feed, other), location of the farm). These variables were defined by consulting the literature to comprehensively understand the interviewees' characteristics. This information is crucial in influencing the analysis and interpretation of the following research findings.

2.2.3. Definition of Attributes and Levels

The literature analysis (Section 2.2.1) and interviews with experts allow for examining farmers' preferences in selecting crop seeds, ensuring that the attributes and levels are specific and familiar to the respondents (corn farmers). A total of 4 attributes—*yield*, *yield under water stress conditions*, *disease resistance*, and *price*—were identified for this study. Initially, 24 levels were selected for the attributes. However, to minimize potential bias and ensure a manageable number of choices for the participants, the levels were further reduced to 13. Indeed, previous studies have shown how the number of attributes and levels must be broad enough to describe the product adequately but not be excessively complex enough to overwhelm the customer, resulting in attention bias [17]. The 13 levels selected were distributed as follows: 3 levels for yield, 3 for yield under water stress conditions, 3 for disease resistance, and 4 for price (Table 1).

Table 1. Final selection of attributes and levels.

Attributes	Levels	Number of Levels
Yield (t/ha)	15 17.5 21.5	3
Yield under water stress conditions (%)	−10 +6 +13	3
Resistance to disease (%)	+10 +20 +50	3
Price (€/dose)	70 90 108 150	4

2.3. The Experimental Design

The questionnaire was developed using the Coordinate Exchange Algorithm (CEA) of Idefix package on R software 2023.03.0+386, generating efficient designs for Choice Experiments. Specifically, the CEA algorithm can optimize and systematically explore the design space, resulting in well-structured and informative data and improving an initial start design by considering changes on an attribute-by-attribute basis. This study uses this algorithm to minimize the D(B)-error based on a multinomial logit model [18]. It is set to calculate different combinations of the selected attributes and levels, resulting in 12 choice sets, each presenting three options (seed A, seed B, and the "none of the above" option). The no-buy allows participants to select neither of the two alternatives, and its inclusion is crucial for replicating a realistic decision-making scenario [18].

2.4. Final Questionnaire

A pilot study on five maize farmers was conducted to assess the method's feasibility and effectiveness and test the validity and reliability of the questions, data collection procedures, and result analysis before implementing it on a larger scale.

Sociodemographic questions related to the sample were integrated into the final questionnaire to gather pertinent information for result analysis. An additional option "none of the above" was included in the choices to minimize potential response distortions. This approach allows us to more accurately and transparently obtain participants' preferences, allowing the expression of interests that is as close to reality as possible.

The survey was sent via email through a public link, which did not require personal information or email address, ensuring anonymity and compliance with GDPR. The final questionnaire, available in Supplementary Materials and administered to farmers using Google modules, is divided into two sections: the first represents the Choice Experiment composed of 12 choice sets developed by the CEA algorithm, and the second includes additional questions about sociodemographic, professional, and company variables. The responses were used to fine-tune the model in R, constructing the final questionnaire to be distributed to a larger sample. In total, 31 respondents were interviewed.

2.5. Result Analysis: The Conditional Logit Model

The theoretical model commonly used was the Random Utility Maximization (RUM) model, based on the assumption of the utility-maximizing behavior of individuals [13]. In the context of the CE, this process refers to determining the values or weights assigned to different attributes or levels within the experiment. When making choices, these preference parameters reflect the relative importance or utility that individuals assign to each attribute or level. By estimating these parameters, researchers can quantitatively analyze and understand the preferences of individuals participating in the CE. The estimation involves statistical techniques or models that aim to capture and quantify the relationship between the attributes/levels and the choices made by individuals, allowing for a deeper understanding of their decision-making behavior [10]. Under the RUM, an individual n out of N individuals faces a choice among J alternatives in one or T repeated choice occasions. The individual n obtains from an alternative j in a choice occasion t a certain level of indirect utility "Unjt". The utility Unjt is then decomposed as:

$$Unjt = Vnjt + \varepsilon njt,$$

where εnjt represents the random factors that affect Unjt but are not included in Vnjt, often known as the deterministic (or representative) utility. The error εnjt is assumed to be a random term with a joint density of the random vector denoted f (εn) = f (εn11, εn2, … εnJT). The deterministic utility Vnjt is usually assumed to be linear in parameters, that is Vnjt = x′ β, where xnjt is a vector of variables njt describing goods or attributes of goods (including their price) that relate to alternative j and β which are unknown coefficients. The utility function modeled for this study is seen as follows:

$$Uji = B1 \times yieldij + B2 \times waterstressij + B3 \times diseaseij + B4 \times priceij + eij + B0 \times nobuy,$$

where i = 1, 2, . . . , n is the number of respondents, j is the alternative option (option 1, option 2, no-buy option); no-buy is an alternative-specific variable to indicate none of the two options presented. Price is a continuous variable referring to the price of a dose of corn seeds. Yieldij, waterstressij, and diseaseij are the variables considered. εnj is the unobserved random error term. Responses were analyzed in R using the Conditional Logit Model (CLM) model.

It is possible to calculate the willingness to pay (WTP) of each attribute by utilizing the following formula:

$$WTP = -(coefVar/coefprice).$$

In this case, coefVar is the specific coefficient assigned to the attribute under consideration, while coefprice represents the estimated price coefficient.

3. Results

3.1. Literature Analysis Results

Farmers worldwide value attributes such as drought resistance, yield, and crop quality, as evident from Italy, Uganda, and Zimbabwe studies [19,20]. The selection of 24 levels was guided by insights from literature research and expert interviews. These levels considered factors such as yield, yield under water stress conditions, and disease resistance percentages in improved varieties. The yield values for the improved variety align with the findings of Pellegrino et al. (2018) [21] and were calculated by adding 5%, 10%, and 15% to the average yield values of the commercial variety. These percentage increases were based on expectations and assumptions about the potential enhancement the improved variety could offer over the existing commercial variety. Using this approach, the researchers could provide an initial estimate of the improved variety's potential yield performance without conducting a full-scale field trial. This method allows for a quick assessment and comparison of the improved variety's performance against the current standard (commercial) variety. Field tests were conducted to evaluate the performance of drought-resistant hybrids under water stress conditions. The results demonstrated an average yield increase of 6.5% in water-scarce environments. Monsanto also reported an 11% to 20% improvement in control plants under severe drought while developing improved varieties [22]. Similarly, the use of improved varieties in terms of water usage, as reported in the study of Gholamin and Khayatnezhad (2020) [23], resulted in yields 10% to 15% higher than traditional hybrids under drought conditions. For these reasons, the values of +6%, +10%, and +15% are included in Table 1 of Section 2.2.3. Regarding the percentages of disease resistance in improved varieties, the values were provided by Sánchez-Toledano et al. (2017) [12]. Regarding the attribute "price", since it can vary greatly depending on the technology used and the maize varieties (low, medium, and high-end), an additional 10%, 15%, and 20% have been added to the original price ranges. The study's chosen percentages (10%, 15%, 20%) are based on researchers' judgment and context, creating a diverse range of price scenarios to assess consumer preferences. They represent moderate to higher price hikes, reflecting real-world market fluctuations for different maize varieties with varying technology levels.

3.2. Pilot Study

The pilot study involved five maize farmers in providing insights, evaluating the quality and relevance of the survey questions, and reducing the potential bias. They were engaged in the process through the presentation of the questionnaire, and their valuable feedback was collected through follow-up telephone interviews. This approach allowed the researchers to assess the clarity, comprehensibility, and applicability of the questions from the perspective of experienced farmers. All participants are farm owners, and almost all are male with at least ten years of experience in the industry. Primarily located in the eastern part of the Lombardy region, almost all farmers cultivate maize for human consumption along with wheat and vegetables. However, there is variability in terms of age, education level, and farm size.

3.3. Final Questionnaire

The questionnaire was administered to 31 farmers, predominantly male (77%), 40-year-old average, highly educated, with 55% having a university degree and finally, over 20 years of experience in corn cultivation. Regarding the professional variables, the company's farmers' roles were 74% owners, 13% agricultural technicians or agronomists, and the remaining 13% held other positions such as sales roles, directors, or employees. Regarding the company variables, the farms operated by the respondents had a Utilised Agricultural Area (SAU) greater than 25 hectares in 61% of cases. The southwest area of Lombardy, mainly the province of Milan, was the most represented region with 35% of the farms. The northwest and southeast areas had equal representation at 23% each, focusing on specific provinces. The remaining 19% were located in the northeastern provinces of Lombardy. Animal feed (55%) was the primary market for corn among respondents, followed by human consumption (35%). A small percentage (10%) used maize for other purposes, such as energy production. Furthermore, most farmers (97%) cultivated crops other than maize, including soy, rice, wheat, fruits, vegetables, and grapes. Most respondents (76%) grew at least three different types of crops, with the combination of four crops being the most common (Table 2).

Table 2. Results of the sample additional information.

Variables	Range	Frequency	Percentage
gender	male	24	77
	female	7	23
age	<40	11	36
	40–50	9	29
	>50	11	35
level of education	university degree	17	55
	diploma	11	35
	other	3	10
years of experience	<10	8	26
	10–20	9	29
	>20	14	45
role in the company	owner	23	74
	other	8	26

Table 2. *Cont.*

Variables	Range	Frequency	Percentage
farm size (SAU)	<25	12	39
	>25	19	61
destination of corn	human nutrition	11	35
	feed	17	55
	other	3	10
number of varieties cultivated	1	2	6
	2	5	16
	3	7	23
	4	14	45
	5	3	10
types of varieties cultivated	corn	2	3
	corn + wheat	23	34
	corn + soy	13	19
	corn + rice	8	12
	corn + fruit	7	11
	corn + vegetables	9	13
	corn + grape	5	8
location of the farm	northwest	7	23
	northeast	6	19
	southwest	11	35
	southeast	7	23

The CE questionnaire analyzed traits related to yield, improvement in yield under water stress, disease resistance, and price per dose. The estimated coefficients from the Conditional Logit Model showed the attribute's utility, that is, the weight of each attribute level in the decision-making process (Figure 2).

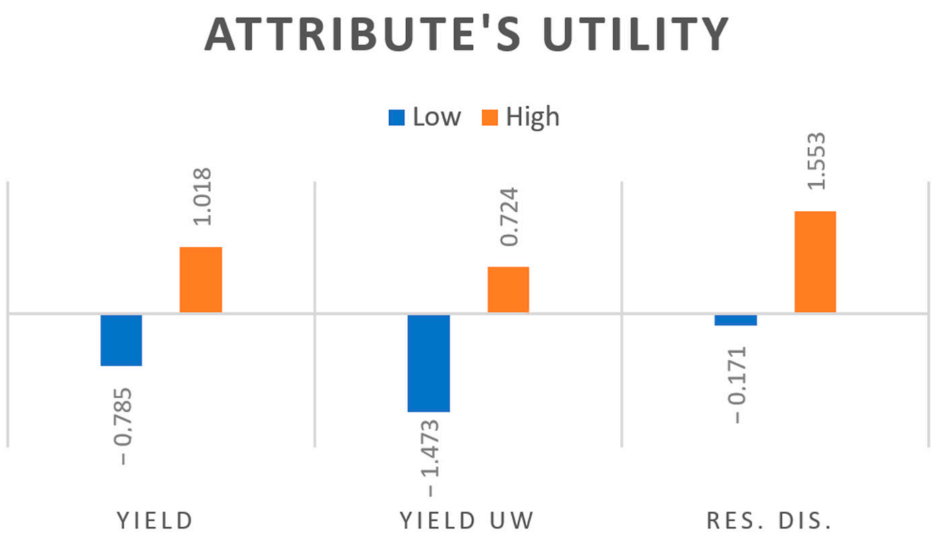

Figure 2. The plot shows the coefficients representing the attribute's weight. The attribute "yield under water stress conditions" is reported as "yield uw" and the attribute "resistance to disease" is reported as "res. dis". The negative coefficients (low), represented in blue, indicate the extent to which the absence of that attribute is problematic and, therefore, the attribute is fundamental. On the other hand, the positive coefficients (high), represented in orange, describe the extent to which the presence of that attribute is an added value for farmers. A very low negative coefficient indicates that the attribute is crucial, and without its presence, the product is not even purchased. To measure the greatest utility for each attribute category, it is necessary to calculate the delta between the high and low values. The attribute with the highest Δ has the highest utility.

According to the Random Utility Model (RUM) described in Section 2.5, farmers have assigned high utility to the attributes of improved yield, disease resistance, and water stress resistance. Furthermore, observing the Δ, which is the difference between the high and low coefficients of each attribute, yield under water stress conditions was considered the most important, followed by total yield and disease resistance.

The estimated parameters, or coefficients, obtained for the Conditional Logit Model are shown in Table 3. These coefficients are associated with the effect or weight of each level in the decision-making process relative to the average attribute effect.

Table 3. Coefficients obtained with R software representing attribute's utility.

Attribute	Level	Coefficient
Yield (t/ha)	15 (Low)	−0.785 ***
	21.5 (High)	1.018 **
Yield under water stress conditions (%)	−10 (Low)	−1.473 ***
	13 (High)	0.724 **
Resistance to disease (%)	10 (Low)	−0.171
	50 (High)	1.553 ***
Price (€/dose)		−0.021 ***

Note: ** $p < 0.05$ *** $p < 0.001$.

All coefficients display a positive sign for the attributes' highest levels, indicating that an increase in utility is linked to the presence of these attributes. Conversely, values lower than the baseline (middle level) exhibit negative signs, reflecting unfavorable characteristics individuals perceive. A coefficient with a low *p*-value (typically less than 0.05)—which represents the probability of obtaining the observed results by chance—indicates that the effect is statistically significant, suggesting that the attribute has a real impact on the choice of alternatives. The levels considered in the final questionnaire are only "low" and "high" because the medium level (present in the pilot) is used as the reference baseline.

Specifically, respondents obtain a utility of 1.8 from increasing yield from 15 t/ha to 21.5 t/ha. However, the most important attribute is "yield under water stress conditions" because the difference between its lowest and highest level is more significant than in yield and resistance to disease (2.19 vs. 1.8 vs. 1.7). Surprisingly, minor weighting was given to the disease resistance attribute, where the percentage improvement from 10% to 50% provides the lowest utility value of the entire graph (1.7). The WTP was computed based on the utility coefficients, showing farmers are positively willing to pay for seeds that provide water stress resistance (Table 4).

Table 4. WTP of the final questionnaire for the two levels of the three attributes.

	Yield	Yield UW	Res. Dis
Low	−36.34 €	−68.21 €	−7.94 €
High	+47.15 €	+33.53 €	+71.93 €

Respondents show a positive WTP for seeds resulting in a more productive corn plant that is more resistant to water stress and disease. If there is a 10% improvement in "disease resistance" and a "yield" of 15 t/ha, farmers would be willing to pay EUR 7.94 less for the former and EUR 36.34 less for the latter, while a 10% decrease in the "performance under water stress" attribute indicates the purchase unavailability to the point that a EUR 68 discount is considered appropriate. The difference between the highest and lowest values for drought resistance is maximum, followed by total yield and disease resistance.

4. Discussion

Because of climate change and all its negative effects, understanding farmers' preferences and willingness to pay a premium price for crop-desirable characteristics is crucial to ensure sustainable production. The current studies analyzing WTP towards specific corn crop traits presented gaps and limitations and to date, there are no studies analyzing Italian farmers' preferences.

Despite the clear advantages and potential gains that enhanced corn varieties can offer to both farmers and the agricultural sector, there is evidence of a disparity between the availability of improved maize traits and their practical adoption in agriculture, highlighting a significant challenge. The objective of the present study is to highlight farmers' preferences towards specific attributes, overcome the state-of-the-art limits and examine the barriers that hinder the effective integration of improved maize varieties into practical farming systems. This article offers insightful guidance for policymakers, researchers, and agricultural stakeholders to collaboratively create a facilitating environment for the introduction of these improved corn varieties, contributing to the development of more sustainable, productive, and resilient agricultural practices.

The additional information's results confirmed the importance of conducting supplementary analyses. Comparing the results of this study with those obtained from previous ones, a preference for the 'drought' attribute is always shown, despite the differences regarding the sociodemographic characteristics of the subjects.

The overall trends observed in the analysis hold within individual categories, indicating the effectiveness of targeted agricultural practices. This highlights the potential for farmers to benefit from innovative approaches, regardless of their specific crop category and context.

The analysis concludes that the most crucial attribute for respondents is higher yield under drought conditions. Since maize is a water-intensive crop, farmers look for varieties that can survive and yield well even with limited water availability. Climate change has increased the frequency of droughts, increasing the risks of crop losses. Therefore, increasing the yield in drought conditions is crucial for the sustainability and profitability of farming operations [24]. In times of drought, higher yield provides production stability, ensuring a consistent supply of maize for various purposes. This has a significant economic impact, boosting farmers' income and profitability [25].

Furthermore, developing drought-tolerant plants is essential to protect crops because the lack of water weakens plants' resistance to pathogens, making them more susceptible to diseases and environmental threats. Water availability is also essential for plant growth and development, as it facilitates nutrient absorption and synthesis of essential compounds. Insufficient water leads to reduced plant size and lower quality of products, rendering them unsuitable for the market.

The findings of previous research [19] that highlighted how high yields and disease resistance are the primary drivers for choosing better seeds are consistent with the importance of drought-resistance crops—characteristics that have a close relationship with crop yield and disease resistance.

For this reason, future research, marketing policies, and investments in this sector should concentrate on developing drought-resistant crop varieties.

Quantifying the essential attributes concerning a crop's drought resistance is a relevant aspect [26], aligning with policy instruments for promoting water reuse in agriculture [27]. Furthermore, the recent approval of Assisted Evolution (AE) Techniques experimentation within Italy's Drought Decree Law emphasizes the urgency of knowing which aspects to prioritize in utilizing these technologies for sustainable agriculture coping with water scarcity.

Finally, the results reveal a close relationship between crop yield and disease resistance characteristics. Despite socioeconomic differences, farmers from Italy, Uganda, and Zimbabwe share similar priorities for drought resistance, yield, and crop quality, indicating common challenges and shared knowledge [20]. Therefore, these attributes have a universal value among maize farmers globally, despite diverse environmental conditions and crop varieties. Farmers from different geographical areas may face similar challenges, such as drought, which threatens agriculture worldwide. Consequently, attributes like drought resistance become shared priorities among farmers in different realities.

Knowledge-sharing platforms, such as international research programs or farmer collaboration networks, facilitate the exchange of experiences and best practices across regions. This influences the outcomes of the comparative evaluation, fostering mutual learning and increasing awareness of farmers' needs and preferences. A comprehensive understanding of farmer preferences and their inclination to pay a premium for seeds possessing desirable traits is necessary for ensuring the sustainable production of corn [28]. This knowledge is crucial in identifying and prioritizing essential varieties and traits, thereby guiding future research and strategic marketing strategies [29]. Moreover, it imparts invaluable insights that inform judicious investment decisions, facilitate product development, and determine research prioritization, culminating in formulating efficacious marketing strategies for the times ahead.

The European Union, which is already taking steps in this direction, must now significantly intensify its efforts and prioritize water management in agriculture [25]. As water scarcity and sustainable resource utilization become increasingly pressing challenges, it becomes imperative for the EU to place even greater emphasis on developing effective strategies, policies, and technologies to ensure efficient water usage and conservation in agricultural practices. This heightened focus will contribute to enhancing agricultural productivity and resilience, foster environmental sustainability, and secure food supplies for the future.

5. Conclusions

Maize, an important cereal crop with a versatile use as food and feed, has a high yield, commercial value, and responsiveness to breeding and genetic modification. However, climate change—with its natural disasters, water scarcity, and the spread of pests—threatens corn and agriculture in general. The development of fortified maize varieties with traits like 'nutrient fortification', 'drought and/or herbicide tolerance', 'disease and/or pest resistance', and 'higher yields' is considered a promising solution to face these modern challenges [30]. In this context, it is crucial to understand farmers' preferences and willingness to pay (WTP) for corn attributes, allowing the design of varieties that meet their requirements. The present study, through a CE analysis of 31 respondents, identified key features for Italian maize farmers, showing that 'drought resistance' is the primary characteristic regardless of the socioeconomic characteristics of the sample.

This awareness is essential for identifying and prioritizing crucial varieties and traits, guiding forthcoming research and marketing strategies. Furthermore, it provides valuable insights to inform investment decisions, guide product development, and establish research priorities, shaping effective marketing plans for the future.

As a result of these findings, practical recommendations can be introduced to encourage the adoption of drought-resistant maize varieties and optimize advantages for farmers:

- Promotion of the new maize varieties: inform Lombard farmers about the drought-resistant maize varieties in the market. This can be achieved through training programs, workshops, and informative campaigns.
- Assistance in variety selection: provide technical support and information to farmers to help them select maize varieties that best suit their specific needs, considering soil conditions, farming practices, and local climate.
- Incentivize adoption: offer financial incentives or tax benefits to encourage farmers to cultivate drought-resistant maize varieties. This could include subsidies for seed purchases or tax breaks for those growing these varieties.
- Investments in research and development: support research and development of new maize varieties that are even more drought-resistant and suitable for Lombard climatic conditions. This can be accomplished through public or private funding and collaborations between research institutions and the agricultural sector.
- Efficient irrigation practices: promote efficient and sustainable irrigation practices to reduce water waste and maximize its use in maize crops.

- Water management plans: develop regional water management plans that consider agricultural and environmental needs, ensuring rational use of available water resources.
- Exchange of experiences among farmers: facilitate exchanges of experiences among Lombard farmers who have successfully adopted drought-resistant maize varieties. This can be carried out through farmer networks, agricultural fairs, and local meetings.
- Monitoring and evaluation: implement monitoring systems to assess the measures' effectiveness and collect farmer feedback to make any necessary improvements.

This innovative research adds value to the existing literature on maize cultivation and provides insights that can inform policies to improve farming practices and increase farmers' incomes.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su151813321/s1, Choice Experiment Questionnaire on Maize Seed Traits for Lombardy Corn Farmers.

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