Does Better Information Drive Better Seed Choices? Experimental Evidence from Kenya

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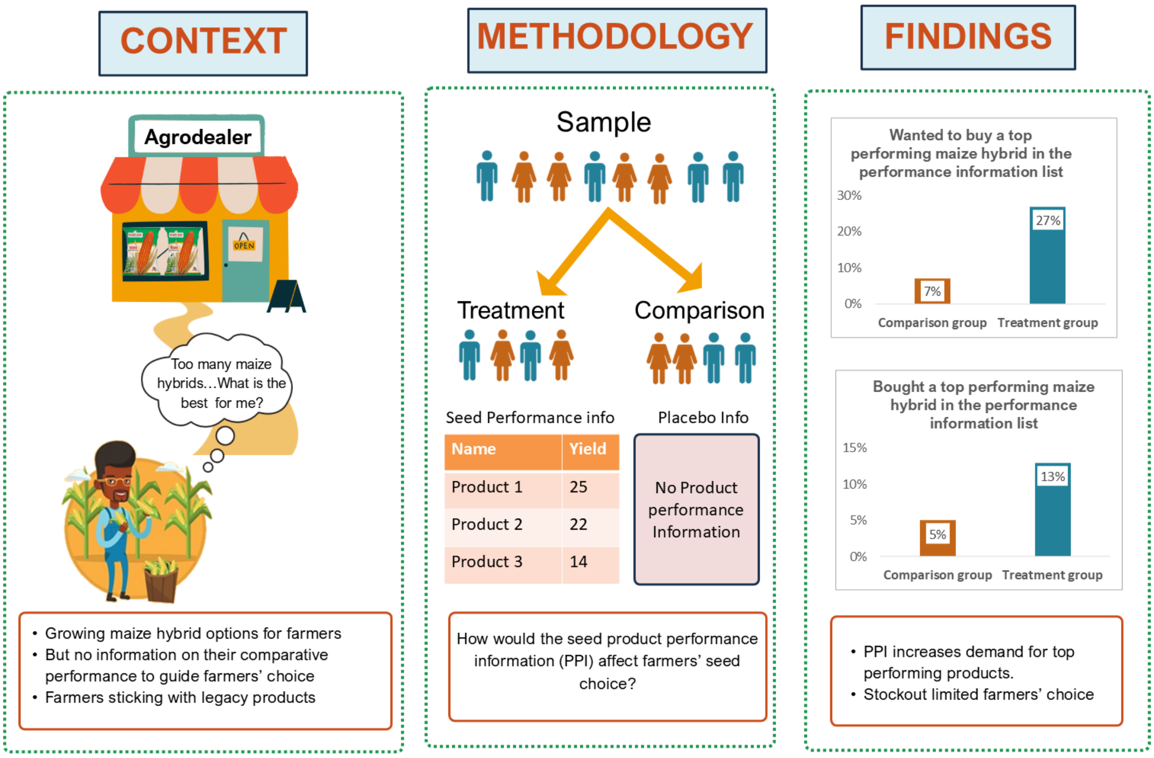
Abstract

Despite advances in hybrid maize performance in Kenya, many farmers continue planting varieties released over two decades ago. Farmer experimentation with and use of relatively newer hybrids is crucial to improve regional food security, especially amid the increasing pressures of climate change. This study uses a randomized controlled trial to assess the degree to which contextually relevant and product-specific performance information influences farmer seed choice. Farmers in the treatment group received yield data for ten hybrids grown by farmers in the previous growing season in their county, while those in the control group received placebo information unrelated to seed selection. The intervention tripled farmers' intent to buy top-performing hybrids (from 7% to 27%) and more than doubled actual purchases (from 5% to 13%). Stockouts prevented some intended purchases, but treated farmers were still more likely to choose these hybrids. This study highlights a critical gap: farmers tend to lack independent and credible up-to-date information on seed performance. Investing in rigorous testing of currently available hybrids and improving how results are shared with farmers can help address this issue. Providing credible performance data can support better decision-making, speed up varietal turnover, and strengthen seed systems in Kenya and beyond.

Key words: Varietal turnover, product performance information, point of sale

Graphical Abstract



1. Introduction

The maize seed sector in Eastern Africa has expanded significantly in recent decades, driven by the entry and continued operation of numerous seed companies including parastatals as well as domestic and multinational firms. Growth in the sector has been supported by public breeding programs which have contributed to the regular release of maize hybrids tailored for a range of agroecological zones (Atlin et al., 2017). Seed distribution systems have also evolved into a well-structured network, with a range of large distributors and thousands of retailers stocking and selling certified seed (Rutsaert & Donovan, 2020a). The adoption of hybrid maize has also increased in the region in recent years; more than 75% of maize farmers in Kenya now plant hybrids, consistent with positive trends observed in other parts of sub-Saharan Africa (Abate et al., 2017; De Groote et al., 2015).

However, an important limitation has started to emerge in these patterns of increasing adoption. Farmers are persistently purchasing older hybrids, leading to slow rates of varietal turnover; continuous breeding and the release of improved hybrids have not proved sufficient to drive varietal replacement. Some maize hybrids have remained in circulation and cultivation for 15, 20, and even 30 years (Abate et al., 2017; Rutsaert & Donovan, 2020b). Available data confirm that old hybrids dominate: the on-farm area weighted average varietal age in Kenya is 18 years and the point-of-sale quantity weighted average is 20 years (market share multiplied by varietal age). Ultra-new and new varieties account for only a small share of the Kenyan maize seed market, while older hybrids remain dominant (Ndegwa et al., 2025).[1] Farmers have proven to consistently prefer familiar varieties, demonstrating brand loyalty even when their preferred product is not readily available (Rutsaert et al., 2024).

The opportunity costs of growing older hybrids are significant (ranging from foregone yields to enhanced disease and pest resistance, drought tolerance and early maturity, etc) but farmers' decision to continue using these older varieties may not be entirely misplaced. Climate change is already changing production conditions, making some older hybrids less effective to current distribution and timing of rainfall, climatic shocks, and evolving variabilities in precipitation and temperature. Compared to past decades, African farmers now contend with increased drought frequency, erratic rainfall distribution, and emerging biotic and abiotic stressors, including new pests and diseases (Cole et al., 2012; Dercon & Christiaensen, 2011; Giné & Yang, 2009; Kew et al., 2021; Ndegwa et al., 2020, 2022). While older hybrids may have once been top performers, well-suited to conditions, they may not always offer optimal yields under present-day conditions. However, farmers' continued preference for these varieties could be based on practical experience, risk management strategies, and their familiarity with historical local growing conditions. This

[1]In this data set, we categorize varieties as follows: Ultra new - 1-5 years since release, New - 5-10 years release, Old – 10-20 years since release and Ultra old – Over 20 years since release. This is relatable to CGIAR classification where varieties aged 10 years and below are deemed new and those above 10 years are deemed old (De Groote et al., 2015).

choice may further likely reflect important constraints such as limited access to reliable performance information, risk aversion, and seed availability challenges.

In contrast, the newer hybrids that many farmers are forgoing are designed to address evolving production challenges and have shown promising results in controlled on-station trials, demonstrating improved resilience and higher yield (Kumar et al., 2023; Waldman et al., 2017). Each year, Kenya's National Performance Trials, overseen by the Kenya Plant Health Inspectorate Service (KEPHIS), evaluate numerous new varieties, of which approximately 16 hybrids receive licensing annually (De Groote et al., 2015). A recently conducted national survey of 1,000 agro-dealers in Kenya identified 25 hybrid maize varieties in the market which were less than ten years old since released, confirming that the seed market is expanding the choices available to farmers. However, limited systematic on-farm testing under real production conditions makes it difficult to assess whether newer hybrids consistently outperform older ones in farmers' fields. As an early contribution moving beyond breeder-managed trials, Ndegwa et al. (2025) use farmer-reported yield data to show that newer maize varieties outperform older ones in farmers' fields in terms of yield performance.

One major factor contributing to slow varietal turnover is the lack of objective, product-specific performance information to guide farmers' seed choices. Despite the increasing number of seed options, farmers often lack comparative yield data across ecological zones, making it difficult to determine when and which varieties to switch to (Rutsaert et al., 2024; Simtowe et al., 2019; Waldman et al., 2017). While performance-based seed selection systems exist in Australia, Canada, the U.S., and the U.K., where farmers rely on publicly funded product performance trials to compare competing varieties (Opoku, 2023; Pellack & Karlen, 2017; Torshizi & Gray, 2022), such systems remain absent in most of Africa.

The absence of an independent, sustained system for generating and disseminating performance data contributes to an environment in which farmers, despite having many choices, continue using outdated, less-adapted hybrids (Essilfie, 2018; Rutsaert & Donovan, 2020b; Sinyolo, 2020). A critical question arises: how long a seed product should remain in the market before being retired and replaced with newer, more advanced varieties? This issue is complex, as responses often favor seed companies, whose primary concern is recouping investment costs and ensuring profitability. This explains why some of the most popular seed varieties—often referred to as the "cash cows"—have remained in the market for decades, continuing to dominate market share despite the availability of newer alternatives.

From a demand-side perspective, the answer to this question may be equally complex, but ideally/logically a seed product should be phased out as soon as a demonstrably better alternative becomes available. However, for this to happen, a transparent, systematic, and independent mechanism for evaluating and disseminating the performance of commercially available seed products is essential. Such a system must go beyond testimonials and commercial advertisements from seed companies and instead provide farmers with credible, side-by-side performance comparisons to facilitate informed decision-making regarding varietal replacement and adoption of superior hybrids.

Policy discussions on Kenya's slow maize varietal turnover have largely focused on diagnosing the problem and its implications. In contrast, potential solutions remain underexplored, aside from emerging work highlighting the roles of farmer experimentation and social networks, agro-dealers, information on new varieties, financial incentives, as well as consumption traits and morphological differences in driving varietal turnover (Kariuki, Muteti, Donovan, et al., 2025; Kariuki, Muteti, Maertens, et al., 2025; Kramer et al., 2025; Ndegwa et al., 2024; Van Campenhout et al., 2025).

This paper takes a step in that direction by examining whether providing farmers with credible, third-party data on varietal performance can encourage experimentation with newer hybrids. Such experimentation may in turn stimulate broader adoption of superior, and often more recently released, maize hybrids. Information is a powerful driver of behavioral change, especially when it highlights the limitations of current practices while offering clear pathways for improvement. For example, Van Campenhout et al. (2021) found that providing rice farmers in Uganda with intensification advisories increased adoption of modern inputs and improved agronomic practices, particularly when the advisories included expected returns on investment. Similarly, Kariuki and Hoffmann (2022) demonstrated that providing consumers with aflatoxin test results on their own maize flour significantly influenced safer brand choices. Complementary work in Kenya reinforces this evidence: Kariuki, Muteti, Donovan, et al. (2025) show that sharing information on why newer is better—combined with details on recently released varieties available in the market—shifted farmer seed choice at the point of sale toward newer hybrids. While promotional discounts amplified the effect, information alone already had a statistically significant impact. In related work, Ndegwa et al. (2024) find that information dissemination by experimenting farmers generated substantial spillovers, with neighboring non-experimenting farmers exhibiting high demand for and adoption of the newer varieties under trial within their villages. Together, these studies underscore the potential of credible and well-targeted information interventions to accelerate varietal turnover by shaping both individual choices and community-level diffusion dynamics. Unlike these earlier studies, our approach departs in some important respects. Rather than promoting specific varieties or directly incentivizing uptake of select products, we provide farmers with credible, third-party performance data on maize hybrids that are already commercially available in the market. This information is presented agnostic of brand or varietal age, enabling farmers to compare options and make their own seed choices based on observed performance rather than directed promotion.

To assess the impact of product-specific yield information on seed selection among Kenyan farmers, we conducted a point-of-sale experiment. Farmers were randomly assigned to a treatment group, which received a free voucher for a 2kg maize seed bag along with yield performance data for maize varieties grown in their county, or they were assigned to a comparison group, which received the voucher without any yield data. The voucher was intended to encourage farmers to experiment with a seed product that was new to them. By analysing differences in the choice of the seed product purchased with the voucher, we isolate the effect of product performance information on farmers' decision-making. Since both groups were provided with an incentive to try an unfamiliar product, any variation in seed choices can be attributed to the role of the product yield performance data in guiding selection.

Our results indicate that treatment farmers positively evaluated the yield information, finding it relevant, trustworthy, and easy to understand. This was reflected in their seed choices, as they showed greater certainty and a stronger preference for high-performing varieties listed in the performance data. Compared to the comparison group, treatment farmers were more likely to select top-performing hybrids for experimentation. However, the intent to experiment with these varieties was higher than actual purchases, likely due to supply constraints such as stockouts, which were beyond the scope of this study.

To the best of our knowledge, this is the first study to rigorously evaluate how product performance information influences farmers' seed choices, especially in Africa. A key challenge in the maize seed sector is the need to encourage more farmer-led experimentation with new seed varieties. Providing farmers with reliable yield performance data can serve as a crucial tool in guiding this experimentation, ultimately facilitating informed transitions to better-performing hybrids. If well executed and widely disseminated, it could also eliminate the need for individual farmer experimentation, thereby reducing the aggregate cost of experimentation. However, a fundamental issue remains, related to how varieties are tested and evaluated within the region. Current testing regimes often fail to provide farmers with accessible, comparative performance data that reflect real farming conditions. Establishing a system for transparent, on-farm product testing and effectively communicating these results back to farmers is essential for strengthening formal maize seed systems. Such an approach would not only empower farmers to make data-driven seed choices but also attract the necessary investments to build a more robust and responsive seed sector. This study contributes to this conversation by assessing whether yield information influences seed selection and, in doing so, helps to make the case for greater investment in systematic seed performance evaluation and dissemination.

The rest of this paper proceeds as follows: we present the study methods in Section 2, where we expound on the study and experimental design, study area and sampling strategy, and data and intervention implementation. We present our results in Section 3 and conclusions and recommendations in Section 4.

2. Methods

2.1 Study and experimental design

This study obtained seed product-specific yield data from farmers who reported their maize yields from the long rains season of March–June 2023.

Regardless of their experimental group, the study encouraged farmers to experiment with new seed products by providing them with vouchers for a 2kg bag of seed as an incentive. Farmers were intercepted at selected agro-dealer shops just before the start of the 2024 long rains maize growing season. Those purchasing maize seed and willing to participate were randomly assigned to either a treatment or comparison group using predefined serial numbers fed into handheld tablets—odd numbers were assigned to the comparison group, and even numbers to the treatment group. Figure 1 presents the experimental design.

All participating farmers received information on the importance of experimenting with seed products on a small portion of their land. Each was given a voucher for a 2kg bag of maize seed, redeemable only for maize seed and only at the agro-dealer shop where they were intercepted. They were encouraged, though not required, to select a seed product they had not grown before. Farmers retained full autonomy in choosing their seed, including the option to purchase what they would have bought regardless of the voucher. See Appendix 3 for the intervention implementation scripts.

In addition to the voucher and experimentation message, treatment group farmers received a laminated chart displaying farmer-reported yield data for ten maize seed products grown in their county during the 2023 long rains season. As shown in Appendix 1, the chart included four columns: product name, years since release, county average yield, and the average yield of the top 25% of farmers. Enumerators reviewed the charts with farmers, but to minimize spillovers, farmers were not given copies to take home. On the other hand, comparison group farmers received a placebo information treatment designed to engage them without influencing their seed choices. As detailed in Appendix 2, they were taken through general fun facts about Kenya and its agriculture. Both groups had the opportunity to select a bag of seed for experimentation.

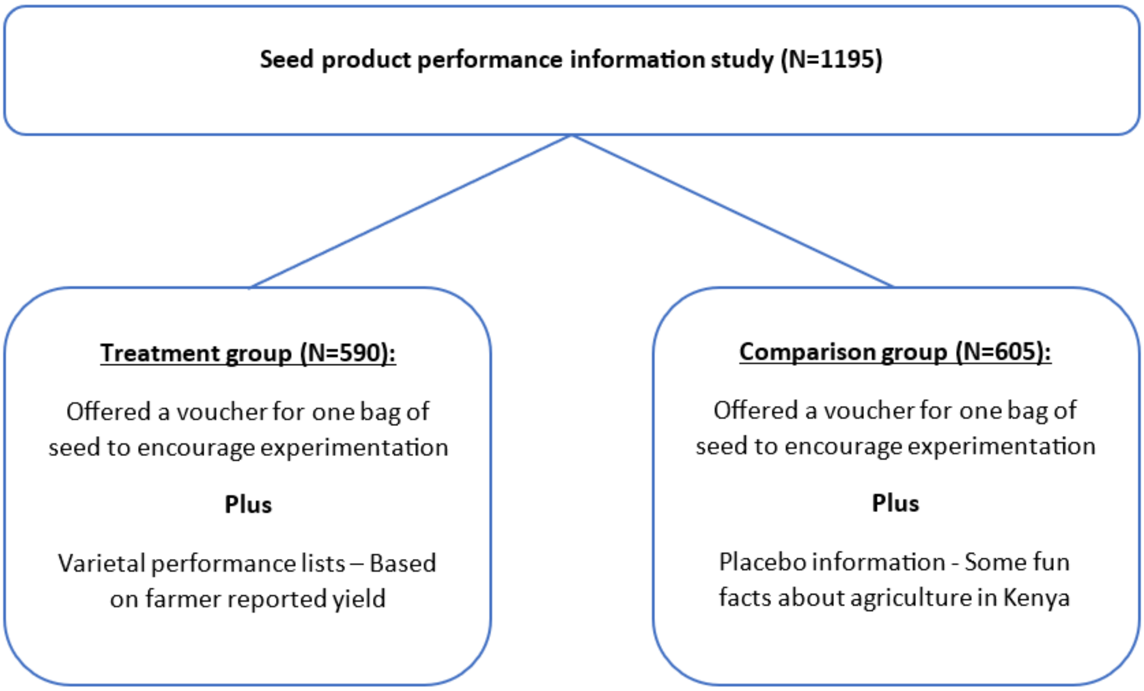


Figure 1: Experimental design. The figure outlines the experimental design of the seed product performance information study involving 1,195 farmers. The treatment group (N=590) received a voucher for one bag of seed along with varietal performance lists based on farmer-reported yields to guide experimentation. The comparison group (N=605) also received a voucher for one bag of seed but was instead provided with placebo information consisting of general agricultural facts. This design allows for isolating the effect of performance information on farmers' seed choice decisions

2.2 Study area and sampling strategy

The study was conducted in Embu and Kirinyaga counties, Kenya, where approximately 70% of the population relies on agriculture. These counties were purposively selected due to the availability of product-specific seed yield data required for the study. The intervention took place at point-of-sale (POS) locations, where enumerators intercepted farmers purchasing maize seed at 36 agro-dealer shops across five towns: Runyenjes and Embu (Embu County), and Kutus, Kagio, and Kerugoya (Kirinyaga County). These towns were selected as key agricultural hubs where reaching the target sample size was feasible. Farmers were approached while entering the shops, except during peak traffic periods when some were let through. To ensure participation from genuine seed buyers, only farmers intending to purchase at least two 2kg bags of maize seed were included. Pre-study sample size calculations indicated that 605 farmers per group (1,210 total) were needed to detect a 5-percentage point increase in the likelihood of purchasing a promoted seed product with 80% statistical power.[2] However, we were practically able to reach

[2]We utilized data from a previous POS information study conducted by our team in 2023 to calculate the required sample size and statistical power for this study. In the earlier study, we determined that the probability of the control/comparison group purchasing the promoted varieties was 11%, with a standard deviation of 0.31. The information treatment in that study resulted in a treatment effect of 0.07, reflecting a 7-percentage-point increase in the likelihood of purchasing promoted varieties compared to the control

1,194 farmers, 46 percent (546) female.

2.3 Data and intervention implementation

Enumerators briefed intercepted farmers about the study and secured consent. Only farmers who reported that they had to come to the store to purchase two or more bags of maize seed during that visit and were willing to participate in the study were engaged further. Enumerators then assigned these farmers to either of the two experimental groups and conducted a brief interview to capture demographic details and to establish which seed varieties they had come to the shop intending to purchase. Farmers from both groups were offered a voucher for one bag (2kg) of maize seed and invited to consider using it for experimentation. This accounted for about 40% of the amount of seed they intended to plant in that season (5kg) as reported during the intercept surveys. Using predetermined scripts (see Appendix 3), treatments were administered as already detailed – product performance information for the treatment group and placebo information for the control group. Both groups only reviewed the information contained in the leaflets but were not allowed to take copies with them.

After the intervention and just before the farmers walked into the agro-dealer store, the enumerators asked the farmer the seed product they intended to purchase for experimentation using the voucher and recorded their response. The farmers were then invited to proceed to the agro-dealer stores to do their shopping, including using their voucher to buy a bag of seed. While at the shop, the agro-dealer and a survey team member stationed inside the shop assisted the farmer to fill in on the voucher the details of the product the farmer asked at first and what they eventually bought with the voucher. Prior to the study, the participating agro-dealers had signed a consent form promising not to influence the farmers' purchasing decisions. However, they were encouraged and allowed to engage the farmers as they would normally, answering questions and making recommendations based on farmer queries.

Upon completing their purchases, farmers exited with a completed voucher containing details of their initial intended product to purchase, the first product they asked for in the store, the product they ultimately purchased with the voucher, and its price. These details were recorded in the survey tool. Enumerators then conducted exit interviews, collecting additional demographic data, details on past and current seed purchases beyond the voucher, and perceptions of maize seed products.

2.4 Relevance of the yield information for farmers

To assess how treatment farmers interacted with the information, we conducted an ex-post evaluation of the varietal performance data used in the information treatment.

group. For the current study, we set a more conservative Minimum Detectable Effect (MDE) of 0.05, two percentage points lower than the effect observed in the previous study. This assumes that the information treatment will increase the likelihood of purchasing promoted varieties by at least 5 percentage points relative to the control group mean. To ensure adequate statistical power (0.8) to detect this effect, a minimum of 605 individuals per group is required for a pairwise comparison. Since the study aims to compare the treatment and comparison groups, optimizing statistical power necessitates equal group sizes. Consequently, our total sample size requirement is 1,210 farmers, with 605 allocated to each group.

Their assessment was measured using a combination of positively and negatively framed questions (Table 1). Most farmers found the information easy to understand, with 95% agreeing or completely agreeing. Similarly, 77% found it easy to recall, though 17% expressed some difficulty, suggesting that reinforcing key messages could enhance retention. Trust in the information was high, with 91% of farmers agreeing or completely agreeing that it was reliable. Usefulness was rated even higher, with 99% acknowledging that the information was beneficial for their seed selection decisions.

Regarding the presentation of the seed products in the list, 85% disagreed or completely disagreed that the list was too long to comprehend, indicating that most farmers found the information manageable. However, 13% found it difficult to differentiate between products, which suggests a need for improved presentation or categorization. While 80% of farmers did not struggle to choose a product, 9% reported some difficulty in selection, indicating that a small proportion may benefit from additional guidance.

Overall, the results suggest that the information was well-received and considered useful, though a small percentage of farmers encountered challenges in recalling, differentiating, or selecting a seed product. Improvements such as clearer visual aids or tailored recommendations could enhance the accessibility and impact of the information.

Table 1: Evaluation of the yield performance data shared with treatment farmers

Information evaluation statements	**Completely disagree**	**Disagree**	**Neither**	**Agree**	**Completely agree**
The information was easy to understand	0.7%	2.7%	1.9%	50.9%	43.8%
The information was easy to recall	1.7%	15.1%	6.3%	53.7%	23.3%
The information was trustworthy	0.3%	2.0%	6.5%	59.4%	31.7%
The information was useful	0.2%	0.2%	0.8%	48.0%	50.8%
List of varieties was too long for me to comprehend	42.3%	42.6%	4.1%	6.6%	0.7%
Information on varieties was similar therefore hard to differentiate	34.8%	44.7%	3.6%	10.7%	1.9%
It was hard for me to choose one product from the list	39.9%	39.9%	1.7%	6.6%	2.7%

Notes: The table reports farmers' evaluation of the yield performance information shared with the treatment group, using a five-point Likert scale (1 = completely disagree to 5 = completely agree). The evaluation combined positively phrased statements with negatively phrased ones, to capture different dimensions of how farmers interacted with the information. Overall, most farmers perceived the information as clear, useful, and trustworthy, though some noted challenges related to the number and similarity of varieties presented, which made product differentiation and choice more difficult.

Further, we assessed whether there were systematic differences in how men and women farmers appreciated and evaluated the product performance information shared. This was done using a pairwise t-test on the 5-point Likert scales used for the ex-post evaluation, comparing mean scores between men and women. The results, presented in Table 2, indicate that while both men and women highly valued the information, men interacted with it more easily and expressed significantly greater appreciation. Men scored significantly higher on three out of four positively framed indicators and significantly lower on all three negatively framed indicators, suggesting that they found the information more accessible and less challenging to navigate than women.

Table 2: Comparison of information evaluation scores between men and women participants

	Women (n=285)	**Men (n=304)**	**Difference**	**t value**	**p value**
The information was easy to understand	4.239	4.444	0.206	-3.55***	0.001
The information was easy to recall	3.723	3.905	0.182	-2.2**	0.029
The information was trustworthy	4.168	4.234	0.065	-1.15	0.241
The information was useful	4.442	4.536	0.094	-2.1**	0.036
The list was too long to comprehend	1.884	1.646	0.238	3.25***	0.001
Information on varieties was similar and hard to differentiate	2.054	1.861	0.193	2.250**	0.024
It was hard to choose a product from the list	1.897	1.737	0.160	1.850*	0.064

Notes: The table compares men's and women's evaluations of the varietal performance information, based on mean scores across a series of five-point Likert scale items (1 = Completely disagree to 5 = Completely agree). The columns report the average scores for women and men, the difference between them, and the associated test statistics (t- and p-values). Significance levels are denoted as: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Overall, there appear to be statistically significant differences between men and women in several evaluation items, though both groups rated the information positively on average.

Finally, to determine which piece of information farmers valued most, we asked them to identify the most meaningful column from the three shared, excluding the first column listing product names. Gender-disaggregated results are presented in Figure 2. The column displaying the average yield for the top quantile (top 25%) was the most appreciated, with half of the treatment farmers selecting it. This column was included to highlight the full potential of the seed products. The county-level average yield was the second most valued, chosen by 40% of treatment farmers, while product age was the least appreciated, selected by only about 10%. There were no appreciable differences between men and women farmers in their preferences.

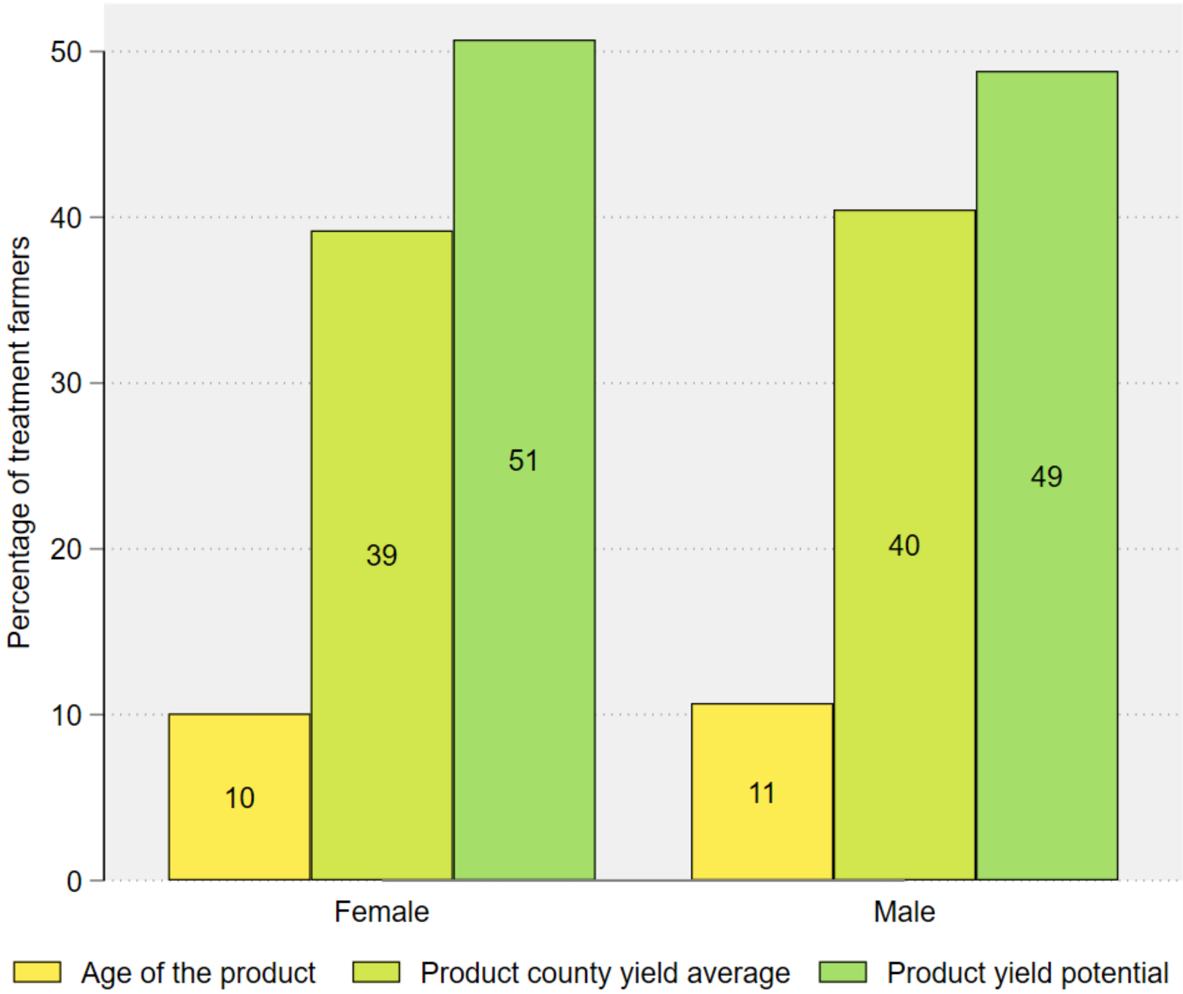


Figure 2: Information on varietal performance charts most salient to farmers, by gender. The figure shows the proportion of female and male farmers highlighting different elements of the varietal performance chart as most meaningful: product age, county yield averages, or product yield potential. Yield-related metrics—especially yield potential—stood out most to both men and women, while relatively few farmers emphasized product age.

2.5 Farmer characteristics and covariate balancing

Table **??** presents the socioeconomic characteristics of the study sample and covariate balancing tests between the treatment and comparison groups. The first three columns report the means for the overall sample, then the comparison and treatment groups, respectively. This provides a descriptive overview of the sample.

Overall, 54% of respondents were male, with an average age of 51 years and 11 years of formal education. Most respondents (96%) were the primary decision-makers regarding maize seed choices for their households, indicating that the point-of-sale can be a reliable interface for targeting farmers. They had an average of 19 years of farming experience, including maize cultivation. Their average risk aversion score, on a scale from 1 (extremely risk-averse) to 9 (extremely risk-loving), was 6, indicating that participants were moderate risk-takers. We used a 6-point scale to assess the frequency of seeking information about new maize varieties, where 0 = never sought such information, 1 = daily, 2 = weekly, 3 = monthly, 4 = seasonally, and 5 = annually. The average score of 3 indicates that farmers typically seek information on monthly bases (roughly), likely aligning with major planting periods.

Nearly all (98%) had planted maize in the past 12 months, and 72% reported selling maize during the same period. They planned to grow an average of 5 kilograms of maize seed during the season, with an average of 1.4 varieties. The majority of farmers (67%) planned to grow only one maize variety during the season, while 26% intended to plant two varieties. A smaller proportion opted for greater diversity, with 5% planning to grow three varieties, 1% planning four varieties, and less than 1% intending to grow five varieties. Overall, most farmers preferred to limit their seed choices to one or two varieties, with only a small percentage considering more diverse options. The weighted average age of maize varieties that farmers planned to purchase during their market visit was 19 years, consistent with findings in existing literature. This reflects the persistence of older maize varieties and the slow adoption of newer hybrids among farmers in Kenya and the region. Yield expectations for maize hybrids were approximately 715 kilograms (about eight 90kg bags) per acre, reflecting realistic projections based on previous farming experiences and local growing conditions.

The last three columns present covariate balance tests assessing the effectiveness of randomization and experimental design. These tests were conducted using regression estimations, where each covariate was regressed against a binary treatment assignment variable (0 = comparison group, 1 = treatment group). The results indicate that the treatment and comparison groups were statistically similar across most covariates, except for gender and age, where significant differences were observed. To account for potential biases, we include all socioeconomic variables as covariates in our regression estimations.

Table 3: Households characteristics and covariate balancing

	Sample means			Balance test between treatment and comparison groups		
	Overall mean	**Comparison mean**	**Treatment mean**	**Coeff**	**Std. errors**	R^2
Male respondent	0.54	0.56	0.52	-0.050*	0.029	0.057
Age of respondent (years)	50.38	51.08	49.66	-1.531**	0.773	0.095
Years of formal education	11.13	11.00	11.26	0.221	0.207	0.090
Main decision maker (maize seed)	0.96	0.96	0.96	0.001	0.012	0.018
Years of maize farming	18.53	18.97	18.09	-0.932	0.771	0.071
Risk aversion score (1–9)	5.92	5.82	6.02	0.169	0.137	0.077
Frequency of seeking info on varieties	3.22	3.21	3.23	0.027	0.095	0.077
Planted maize in last 12 months	0.98	0.98	0.97	-0.008	0.009	0.035
Sold maize in last 12 months	0.71	0.72	0.69	-0.025	0.026	0.084
Seed planned (kg)	4.84	4.69	5.00	0.281	0.212	0.085
No. of varieties planned	1.41	1.41	1.41	-0.005	0.038	0.100
Weighted avg. age of hybrids planned (yrs)	19.18	19.21	19.15	-0.004	0.498	0.073
Yield expectation (kg/acre)	714.74	713.95	715.55	1.223	3.221	0.025

Notes: This table reports descriptive statistics for key household characteristics and balance tests comparing treatment and comparison groups. The first three columns present sample means (overall, comparison, and treatment), while the last three columns show regression-based balance tests: estimated coefficient, standard error, and R^2. Statistical significance is indicated by ** $p < 0.05$ and * $p < 0.10$. Out of the 13 variables tested, only two show statistically significant differences, and these are marginal. This indicates that randomization achieved balanced experimental groups, with no systematic differences between treatment and comparison households.

3. Results

Our results include descriptive comparisons of the main outcomes between treatment and comparison farmers as well as regression analysis assessing the effect of the information on those outcomes. For treatment effect estimation, we use simple mean differences (SMD) estimated through ordinary least squares (OLS) for continuous outcomes and a linear probability model (LPM) for binary outcomes. The LPM is selected for its simplicity and ease of interpretation, and it is widely accepted for analyzing binary outcomes within a randomized controlled trial (RCT) framework. We use the following general regression equation to estimate the effects of our treatment on a set of target outcomes:

$$Y_i = \beta_0 + \beta_1 T_i + \gamma' X_i^k + \delta_m + \pi_j + \varepsilon_i, \tag{1}$$

where Y_i is a vector of observed outcome variables for farmer i post-treatment, T_i is the treatment indicator (equal to one if farmer i was randomly assigned to the treatment group and zero otherwise), δ_m and π_j are town- and shop-level fixed effects, respectively, and ε_i is the idiosyncratic error term. To improve estimation precision, we include X_i^k, a vector of farmer socioeconomic characteristics. For treatment effect estimation, we test the null hypothesis $H_0 : \beta_1 = 0$.

3.1 Demand and purchases of products for experimentation

Table 4 summarizes the demand and purchase patterns for different seed products for experimentation, disaggregated by treatment status. It presents the demand and purchases for listed products based on their position in the information chart and includes an additional row aggregating unlisted products. We only show the product positions here, blinding the actual product identities mainly to maintain a discourse that is about the potential of the product performance data in influencing farmer decisions, avoiding a digression to discussions about specific products.

Considering the demand panel of the Table, about 4% of comparison farmers and 20% of treatment farmers expressed interest in experimenting with the top-performing product, a statistically significant difference. Similarly, 3% of comparison farmers and 8% of treatment farmers desired to experiment with the second product on the list, also showing a statistically significant difference. A notable difference was also observed in the demand for the product listed seventh, where 16% of comparison farmers and 12% of treatment farmers selected it for experimentation. For all other listed products, there was no statistically significant difference in demand between the two groups. However, demand for unlisted products was significantly higher among comparison farmers (35%) than treatment farmers (20%).

The purchase panel of Table 4 shows that 2% of comparison farmers and 5% of treatment farmers used their vouchers to buy the top-listed product for experimentation, a statistically significant difference. The proportion of farmers purchasing the second-listed product increased modestly from 3% among comparison farmers to 5% among treatment farmers, though this difference was not statistically significant. Additionally, a small but statistically significant increase was observed in the purchase of the fourth-listed product, with 10% of comparison farmers and 13% of treatment farmers selecting it. Consistent with the demand patterns, the share of farmers using vouchers to buy unlisted products was significantly higher among comparison farmers (30%) than treatment farmers (22%).

Table 4: Demand and purchase behaviour of farmers on listed maize seed products

Product details	**Demand of products**			**Purchase of products**		
Position in the list	**Share of comparison farmers**	**Share of treatment farmers**	***p*-value**	**Share of comparison farmers**	**Share of treatment farmers**	***p*-value**
Product 1	0.036	0.203	0.000	0.020	0.045	0.016
Product 2	0.033	0.080	0.001	0.034	0.047	0.248
Product 3	0.021	0.024	0.712	0.024	0.021	0.755
Product 4	0.091	0.111	0.265	0.101	0.134	0.081
Product 5	0.060	0.066	0.659	0.045	0.058	0.355
Product 6	0.058	0.040	0.159	0.047	0.035	0.288
Product 7	0.158	0.121	0.076	0.204	0.235	0.200
Product 8	0.051	0.046	0.754	0.051	0.044	0.571
Product 9	0.122	0.093	0.114	0.157	0.136	0.312
Product 10	0.025	0.021	0.672	0.020	0.022	0.776
Unlisted	0.346	0.196	0.000	0.299	0.226	0.005

Notes: The table reports farmers' demand and purchase behavior for maize seed products listed in the performance information sheets (Product 1 - 10) and unlisted products. Shares represent the proportion of comparison and treatment farmers demanding or purchasing each product, with *p*-values testing equality across groups. The first column indicates the product's position in the list, followed by three columns on demand shares and three columns on purchase shares. Treatment farmers were more likely to demand and purchase products appearing at the top of the performance list (notably Products 1 and 2), while demand for unlisted products was significantly lower among them.

3.2 Effect of yield information on farmer product choice

Intended product

Right after taking them through the treatment scripts, we asked farmers what seed product they intended to buy with the voucher. Here, we examine the effect of our intervention on seed choice using four outcomes namely: choice certainty (farmer knew what they wanted to experiment with), farmer intended to experiment with a listed seed product, farmer intended to experiment with one of the two top performers in the list and the position (out of 10) in the performance list of the product farmer intended to experiment with.

Nearly all farmers reported a seed product they intended to buy with the voucher - except about 5% of farmers in the comparison group and 2% in the treatment group (see Graph 1 in Figure 3) who indicated they did not know what they could buy with the voucher. As shown in Column 1 of Table 5, this represents a substantial and statistically significant *p-value*< 0.01 decrease in the uncertainty experienced when selecting a seed product to experiment with.

About 62% of farmers in the comparison group wanted to experiment with a product listed in the performance data chart (see Graph 2 in Figure 3).[3] The share indicating to want to experiment with a seed product listed in the performance data chart increased to

[3]These control farmers did not see the performance data chart, but the products on the chart are commercially available in the region. Most of them were already familiar to farmers and a few were new.

78% among farmers in the treatment group. As shown in Column 2 of Table 5, product performance information increased the likelihood of wanting to experiment with a listed product by 17 percentage points and this effect was statistically significant $p < 0.01$.

As shown by Graph 3 in Figure 3, farmers who received the product performance information were attracted to the top performing seed products in the list. While only 7% of farmers in the comparison group wanted to experiment with one of the top two products in the performance data, 27% of farmers in the treatment group indicated wanting to experiment with those products. The information intervention increased the likelihood of wanting to experiment with top two performers in the lists by about 21 percentage points, representing a 286% increase, and this was statistically significant *p-value*< 0.01, Column3 of Table 5).

Out of 10 seed products listed in order of performance, the average listing position of the products desired by comparison farmers was 6.2, whereas it was 4.6 for treatment farmers (Graph 4, Figure 3). This suggests that, beyond preferring listed products, treatment farmers were more likely to select higher-yielding varieties. This difference was also statistically significant $p < 0.01$ as shown in Column 4 of Table 5.

Table 5: Treatment effect on the product farmers reported they would purchase with the voucher

	(1) Did not know	**(2)** Listed product	**(3)** Top-2 variety	**(4)** Position in list
Information group	-0.036***	0.167***	0.207***	-1.495***
	(0.011)	(0.025)	(0.020)	(0.189)
Intercept	-0.000	1.000**	0.000	7.000***
	(0.188)	(0.423)	(0.351)	(2.678)
Observations	1195	1195	1195	839
R^2	0.054	0.176	0.147	0.149
Mean of comparison group	0.055	0.617	0.066	6.158
Socioeconomic covariates	Yes	Yes	Yes	Yes
Town and shop fixed effects	Yes	Yes	Yes	Yes

Notes: Each column reports the effect of receiving varietal performance information on farmers' intended use of the seed voucher, but using different outcomes. Column (1) is a binary outcome equal to one if the farmer reported not knowing which product to purchase with the voucher. Column (2) captures whether the farmer wanted to use the voucher on any product listed in the performance information chart. Column (3) narrows this to whether the farmer intended to buy one of the top two varieties in the chart. Column (4) reports the position in the performance list of the product the farmer intended to purchase (lower values correspond to better-ranked varieties). All regressions control for socioeconomic covariates as well as town and shop fixed effects. Standard errors are reported in parentheses. Significance levels are denoted as: *** $p < 0.01$ and ** $p < 0.05$.

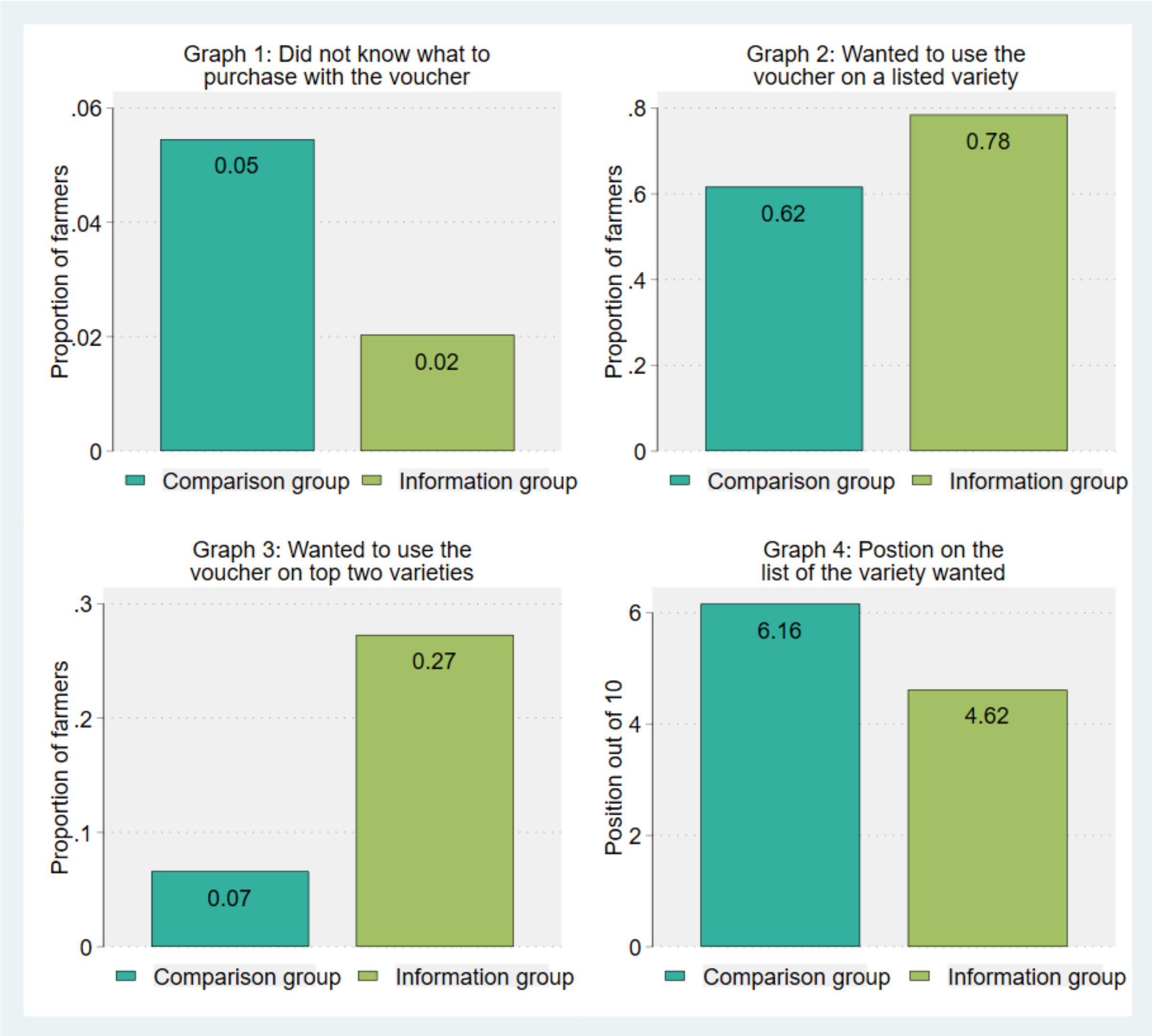


Figure 3: Voucher purchase intentions by treatment status. The figure compares farmers' intended use of seed purchase vouchers between the information and comparison groups. Four separate panels illustrate different outcome measures: (1) whether farmers were uncertain about what to purchase, (2) whether they intended to use the voucher on a product listed in the performance information chart, (3) whether they intended to select one of the top two listed varieties, and (4) the rank position in the performance list of the intended product. Each bar shows the proportion (or average rank) for farmers in the information and comparison groups, allowing a structured visualization of how information provision influenced stated voucher use.

Actual purchases

We further conducted exit interviews as participants left the agro-dealers' shops after making their purchases. Farmers were asked about the seed product they ultimately bought using the voucher, allowing us to observe seed purchases after relaxing information and liquidity constraints for the treatment group, and only liquidity constraints for the control group. This final step enabled a more comprehensive understanding of how farmers' choices translated from intention to actual purchase.

Here, we examine the effect of our intervention on seed choice using four outcomes namely: binary indicator equal to one if farmer did not redeem their voucher for any seed product and zero otherwise, farmer bought a listed seed product to experiment with, farmer bought one of the top two products in the performance list to experiment with and the position (out of 10) in the performance list of the product farmer bought to experiment with.

Only about 2% of farmers who did not buy any seed product for experimentation using the voucher, without any discernible differences between comparison and treatment groups (see Graph 1 in Figure 4). They cited stock-outs for the seed product they desired to experiment with as the main reason for not purchasing anything.

As shown in Graph 2 of Figure 4, approximately 69% of farmers in the control group and 75% in the treatment group used their voucher to purchase a seed product listed on the performance information chart for experimentation. This represents a statistically significant treatment effect of about seven percentage points (*p-value*< 0.01, see Column 2 of Table 6). Notably, farmers in the control group exhibited a considerable shift from their initially intended seed choices. While only 62% initially expressed a desire to experiment with a listed seed product, 69% ultimately purchased one. This shift is likely influenced by agro-dealers, particularly among control farmers who were uncertain about their selection and sought recommendations. Although agro-dealers did not have access to the seed product performance data, they may have inadvertently suggested a listed product. In contrast, no such shift was observed among treatment farmers; in fact, the proportion who purchased a listed product was slightly lower than those who initially intended to experiment with one.

Product performance information increased the likelihood of experimenting with the top-performing products listed in the information chart. While only 5% of farmers in the comparison group purchased one of the top two performers for experimentation, 13% of those in the treatment group did so (see Graph 3 of Figure 4). This represents a treatment effect of eight percentage points, equivalent to a 160% increase in the likelihood of selecting top-performing products, a statistically significant effect (*p-value*< 0.01, see Column 3 of Table 6). Notable differences emerged between the seed varieties farmers initially intended to experiment with and what they ultimately purchased using the voucher. While 7% of comparison group farmers expressed interest in experimenting with a top-two product, only 5% followed through with the purchase. Similarly, although 27% of treatment group farmers intended to experiment with a top-two product, only 13% did so. These discrepancies were largely due to stockouts, which forced farmers to choose alternative varieties—often based on recommendations from agro-dealers.

Lastly, as shown in Graph 4 of Figure 4, the information treatment led to a marginal shift in the average position of the purchased varieties on the product information list. Among farmers in the comparison group, the average position of the purchased products was 6.4 out of 10, while for treatment farmers, this decreased to 6 out of 10, indicating a slight decrease in the position on the performance list of purchased products. Although the effect size is small, it is statistically significant (p-$value < 0.05$, see Column 4 of Table 6).

Table 6: Treatment effect on the product farmers eventually purchased with the voucher

	(1) Did not redeem	**(2)** Listed product	**(3)** Top-2 variety	**(4)** Position in list
Information group	0.004	0.066***	0.084***	-0.311**
	(0.008)	(0.024)	(0.016)	(0.155)
Intercept	-0.000	1.000**	-0.000	7.000***
	(0.136)	(0.420)	(0.276)	(2.250)
Observations	1195	1195	1195	1169
R^2	0.086	0.154	0.098	0.149
Mean of comparison group	0.017	0.686	0.048	6.429
Socioeconomic covariates	Yes	Yes	Yes	Yes
Town and shop fixed effects	Yes	Yes	Yes	Yes

Notes: Each column reports the effect of providing varietal performance information on farmers' voucher purchases, with each column corresponding to a distinct outcome. Column (1) measures whether farmers failed to redeem their voucher, i.e., did not use it to buy any seed. Column (2) indicates whether the purchased product appeared in the performance information chart. Column (3) further narrows this to whether the product was among the top two varieties in the chart. Column (4) records the rank position of the purchased product in the list (lower values indicate better-ranked varieties). All regressions include socioeconomic covariates as well as town and shop fixed effects. Standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$.

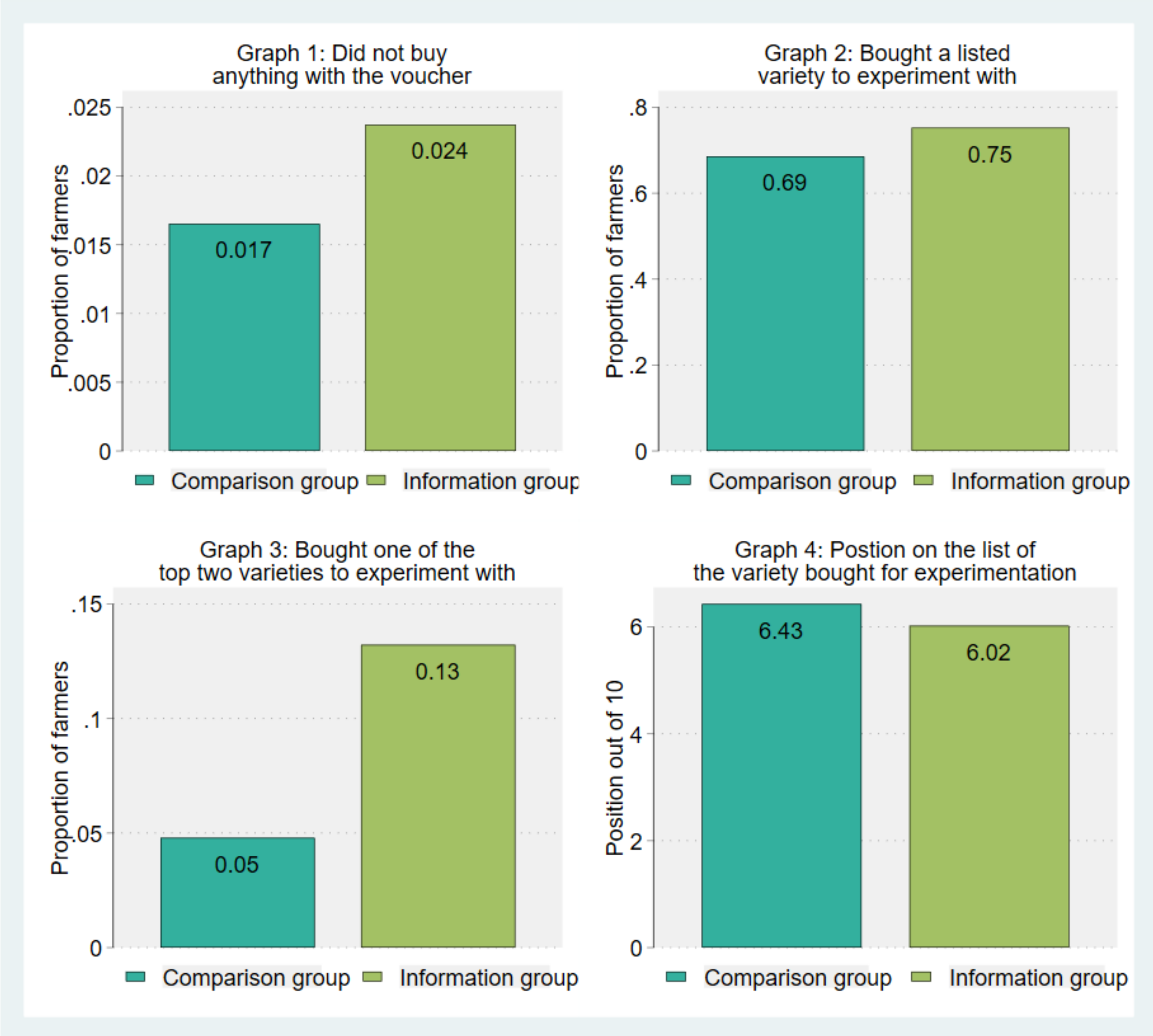


Figure 4: Details of the seed products purchased using the voucher. The figure illustrates farmers' actual use of vouchers across the information and comparison groups. The figure is organized into four panels: Graph 1 shows the proportion of farmers who did not redeem their voucher; Graph 2 indicates whether the purchased product was listed in the performance information table; Graph 3 focuses on whether farmers bought one of the top two varieties; and Graph 4 presents the average position of the purchased variety on the performance list. Bars represent the proportion of farmers (Graphs 1–3) or the mean rank (Graph 4) for each group. This structure allows direct comparison of voucher redemption patterns, uptake of listed products, and ranking of chosen varieties between groups.

3.3 Reasons for spending the voucher on a specific product

We asked farmers why they selected a particular seed product using the vouchers. This was a multiple-response question, and the results are presented in Figure 5.

The most cited reasons across both groups were preferred traits, experience with the product, potential yield, and agroecological suitability. Half of the farmers in the comparison group and 44% in the treatment group based their choice on preferred traits, making it the most influential factor. Prior experience with the product was also a key reason, reported by 39% of comparison farmers and 36% of treatment farmers. Potential yield was an important consideration for both groups, with 32% mentioning it as a factor in their decision. Agroecological suitability was slightly more influential in the comparison group, at 28%, compared to 24% in the treatment group.

One notable difference is that more treatment farmers, at 17%, reported selecting a product because their intended choice was unavailable, compared to 12% in the comparison group. This suggests that stockouts or availability constraints influenced seed purchases more in the treatment group. Market preference was cited by a similar proportion of farmers in both groups, with 12% in the comparison group and 13% in the treatment group, indicating that potential market demand factored into some farmers' decisions.

External influences played some role too in seed selection, but slightly higher among the comparison farmers. Influence from agro-dealers in the comparison group was at 15% and 11% in the treatment group, possibly indicating that treatment farmers relied more on the provided performance information than on dealer recommendations. Similarly, influence from fellow farmers was low across both groups, with 6% in the comparison group and 5% in the treatment group. Only a few farmers reported making random choices or being influenced by price, the free voucher, brand, or fellow farmers. This suggests that farmers exercise caution and agency in selecting seed products, particularly for experimentation.

3.4 Use of vouchers on new products

Here, we assess whether farmers genuinely used their vouchers to experiment with new seed products or simply applied them to products they had already intended to buy, regardless of the voucher. Since the voucher was restricted to maize seed but not to any specific maize seed product, and farmers were encouraged—but not required—to use it for a seed product new to them, they could respond in several ways.

First, they could have proceeded with their original plan, purchasing only the seed type and quantity they had come to buy while using the voucher to offset costs, effectively reallocating the saved funds elsewhere. Second, they could have purchased the same products they originally intended but increased the quantity by one additional bag. This response would likely be more common among farmers who needed more seed but were liquidity constrained or those who were risk-averse and preferred not to experiment, even when the cost was partially alleviated. Third, some farmers may have taken the voucher

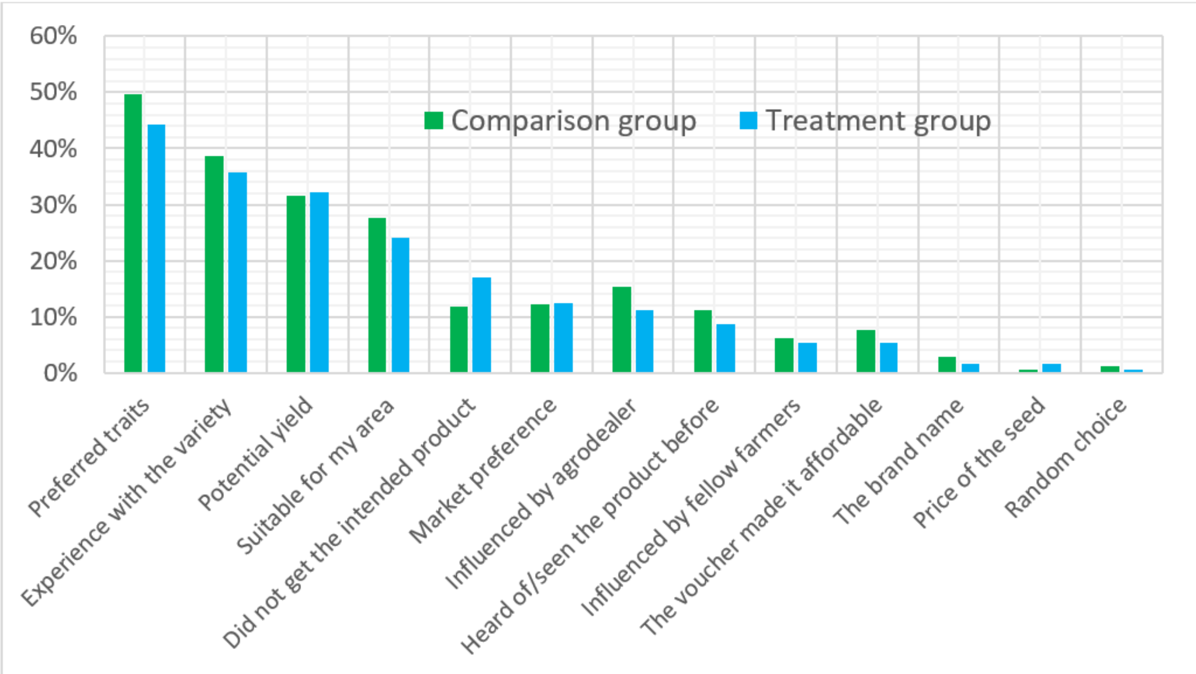


Figure 5: Reason for selecting voucher product. Figure 5 presents farmers' stated reasons for choosing the seed products they redeemed with vouchers, comparing treatment and comparison groups. Each bar shows the proportion of farmers citing a given reason, with categories including varietal traits, prior experience, expected yield, suitability for the area, and market preference. Other channels of influence—such as agro-dealers, fellow farmers, or prior exposure to the product—are also represented, alongside factors like affordability, price, or brand name.

but chosen not to use it at all, either because they were unsure of what to experiment with or because they could not find their preferred product and were unwilling to accept alternatives suggested by agro-dealers or other sources. Finally, some farmers could have followed our recommendation on the importance of experimentation and used the voucher to purchase a seed product that was new to them, different from what they initially intended to buy.

Product performance information may have addressed some of the constraints leading to the first three responses, increasing the likelihood that treatment farmers, more than comparison farmers, would select a product different from what they had originally planned to buy or from what they purchased for their main maize seed needs. To evaluate this, we compare the voucher product (both intended and actually purchased) with the products farmers bought independently of the voucher for their main seed purchases.

These results are presented in Table 7. Columns 1 and 2 examine whether the product a farmer intended to buy or ultimately purchased with the voucher was among the products they originally planned to purchase. Columns 3 and 4 assess whether the product they intended to buy or actually bought with the voucher was among the seed products they purchased independent of the voucher for their general maize seed needs.

As shown in Column 1, 24% of comparison group farmers intended to buy a product with the voucher that was not among the products they had initially planned to purchase.

The product performance information increased this likelihood by 18 percentage points, reaching 43%, and the effect was statistically significant (*p-value* < 0.01). Similarly, as shown in Column 2, the likelihood that the product purchased with the voucher was not among those originally intended was higher in the treatment group, increasing by two percentage points from 41% in the comparison group. However, this effect was not statistically significant.

Further, results in Column 3 show that the information intervention increased the likelihood that the product farmers wanted to buy with the voucher was not among those purchased for their general maize seed needs by 11 percentage points, rising from 0.3% in the comparison group to 12% in the treatment group *p-value* < 0.01. Similarly, the intervention increased the likelihood that the product bought with the voucher was not among those purchased for general maize seed needs by about one percentage point from 0.3% in the comparison group, and the effect was statistically significant (*p-value* < 0.01).

These findings suggest that product performance information significantly increased the likelihood that the voucher was used for experimenting with newer seed products, or seed products farmers had not grown before.

Table 7: Comparing the voucher seeds with the seeds bought for their main seed purchases independent of the voucher

	(1) The product farmer wanted to buy with the voucher was not among the varieties they had come to the shop planning to purchase	**(2)** The product farmer bought with the voucher was not among the varieties they had come to the shop planning to purchase	**(3)** The product farmer planned to buy with the voucher was not among what they bought for their general purchases independent of the voucher	**(4)** The product farmer bought with the voucher was not among what they bought for their general purchases independent of the voucher
Information group	0.178^{***} (0.027)	0.018 (0.028)	0.113^{***} (0.025)	0.010^{**} (0.005)
Observations	1099.000	1195.000	1099.000	1195.000
R^2	0.147	0.095	0.207	0.033
Mean of comparison group	0.244	0.410	0.003	0.003
Socioeconomic covariates	Yes	Yes	Yes	Yes
Town and shop fixed effects	Yes	Yes	Yes	Yes

Notes: Each column compares voucher seed choices with farmers' planned or actual purchases beyond the voucher product. Column (1) tests whether the product farmers intended to buy with the voucher differed from what they had planned to purchase before visiting the shop. Column (2) does the same for the actual voucher purchase. Column (3) compares intended voucher choices with farmers' general seed purchases made independently of the voucher, while Column (4) compares the actual voucher purchase with general purchases. All regressions include socioeconomic covariates as well as town and shop fixed effects. Standard errors are reported in parentheses. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$.

3.5 Effect on general seed purchases beyond the one bag bought with the voucher

We now turn to the effect of our intervention on general maize seed purchases beyond the single bag acquired with the voucher for experimentation. While these effects were not part of the study's original design, they are important to examine, particularly in assessing the potential of product performance information to influence farmers' seed choices beyond experimentation.

To analyse this, we first create a binary indicator identifying farmers who included at least one of the ten products listed in the product performance chart among their general seed purchases, excluding the voucher product. Another binary indicator captures those who purchased at least one of the top two performing products from the chart. Additionally, we define two binary indicators to identify farmers who switched to any of the listed products and those who switched specifically to either of the two top-performing products. In this context, switching refers to a situation where a farmer did not initially express an intention to buy a particular seed product prior to our intervention but ultimately purchased it, excluding the product bought with the voucher.

As shown in Table 8, our intervention influenced farmers' seed choices beyond the voucher product, particularly toward the top-performing varieties in the performance chart. Results in Column 2 indicate that, compared to farmers in the comparison group, treatment farmers were more likely to purchase one of the top two performing products. The intervention increased this likelihood by approximately four percentage points, from 6% in the comparison group to 10% in the treatment group (p-$value < 0.01$). Similarly, as shown in Column 4, treatment farmers were also more likely to switch to the top-performing products, with an increase of four percentage points compared to the comparison group. This suggests that the likelihood of switching to these products rose from 4% among comparison farmers to 8% among treatment farmers (p-$value < 0.01$).

Table 8: Effect of information on maize seeds purchased independent of the voucher

	(1) Farmer bought listed products for their main seed purchases	**(2)** Farmer bought listed top two products for their main seed purchases	**(3)** Farmer switched to listed products for their main seed purchases	**(4)** Farmer switched to listed top two products for their main seed purchases
Information group	0.015	0.044***	-0.002	0.043***
	(0.022)	(0.014)	(0.018)	(0.013)
Intercept	1.000***	0.000	0.000	-0.000
	(0.374)	(0.248)	(0.313)	(0.219)
Observations	1195.000	1195.000	1169.000	1169.000
R^2	0.173	0.195	0.048	0.152
Mean of comparison group	0.785	0.060	0.003	0.037
Socioeconomic covariates	Yes	Yes	Yes	Yes
Town and shop fixed effects	Yes	Yes	Yes	Yes

Notes: The table reports treatment effects on farmers' main seed purchases made outside of the voucher program. Each column corresponds to a distinct outcome: Column (1) tests whether farmers bought any product listed in the performance information table; Column (2) restricts this to whether the main seed purchase was one of the top two listed products; Column (3) examines whether farmers switched from their original seed plans to any listed product; and Column (4) further narrows this to switching toward the top two listed products. All regressions include socioeconomic covariates as well as town and shop fixed effects. Standard errors are shown in parentheses. *** $p < 0.01$.

3.6 Farmers' recommendation on information packaging

Using a multiple-response question, farmers were asked how they would prefer such information to be delivered in the future. Gender-disaggregated results are presented in Table 6, along with a t-test to assess differences in channel preferences between men and women. Television, leaflets, and videos were the most preferred information channels, each selected by more than a third of respondents. Bulk messaging (SMS) followed, chosen by about a quarter of participants. Posters were also a notable channel, selected by approximately 17% of farmers, closely followed by radio advertisements at around 12%.

There were no statistically significant gender differences in channel preferences, except for television. A significantly higher proportion of men (48%) than women (40%) preferred television as a future channel for delivering such information.

Table 9: How would you like to receive such information in future

	Women (n=285)	**Men (n=304)**	**Difference**	**t value**	**p value**
Television	0.397	0.477	0.081**	-1.95	0.049
Leaflets	0.386	0.379	0.007	0.20	0.849
Videos	0.386	0.379	0.007	0.20	0.849
SMSs	0.260	0.234	0.026	0.75	0.464
Posters	0.158	0.175	0.017	-0.55	0.593
Radio adverts	0.109	0.125	0.016	-0.60	0.541
Phone call	0.028	0.030	0.002	-0.10	0.911
Demo plots	0.007	0.010	0.003	-0.35	0.719
Emails	0.014	0.010	0.004	0.45	0.641
WhatsApp	0.014	0.007	0.007	0.90	0.368
Barazas/groups	0.000	0.007	0.007	-1.35	0.171
Internet	0.018	0.004	0.015*	1.70	0.086
Farm field days	0.004	0.004	0.000	0.05	0.964
In person training	0.007	0.000	0.007	1.45	0.144

Notes: The table reports farmers' preferred channels for receiving agricultural information, disaggregated by gender. Columns show proportions for women (n=285) and men (n=304), the difference in proportions (men minus women), and the associated t and p values. Preferences cover a range of media, including mass communication (television, radio, posters), digital tools (SMS, WhatsApp, internet), and interpersonal channels (barazas, farm field days, in-person training). Significance levels indicate whether men and women differed systematically in their preferences, with only a few channels showing statistically significant gaps. Significance levels: $^{**}p < 0.05$, $^{*}p < 0.10$.).

4. Conclusion and recommendations

This study examines how product performance (yield) information can help maize farmers in Kenya make more informed seed choices. Despite the high adoption rates of hybrid maize varieties, a robust seed system, and frequent releases of improved hybrids, many farmers in Kenya continue using older varieties that may no longer be well-suited to current climatic conditions. To address this challenge, we encouraged farmers to experiment with a 2 kg bag of maize hybrid seed they had not grown before, providing them with a free voucher for the experimentation seed. Farmers were randomly assigned to either a treatment group, which received yield performance data for ten maize hybrids in their county, or a comparison group, which received a placebo information treatment. Farmers in the treatment group found the yield information trustworthy, easy to understand, and useful for decision-making. This led to increased confidence in their seed choices and a greater preference for the top-performing hybrids. However, while access to performance data increased demand for certain varieties, actual purchases were also influenced by seed stock availability. Consequently, both groups adjusted their final selections, though the treatment group remained more aligned with the high-performing hybrids listed in the data.

This study contributes to the growing but limited literature on low varietal turnover in African maize production. While previous research has diagnosed the issue and its impact on productivity and farmer welfare (Abate et al., 2017; Atlin et al., 2017; Chivasa et al., 2022; De Groote & Omondi, 2023; Mathenge et al., 2014; Rutsaert & Donovan, 2020b; Rutsaert et al., 2024; Spielman & Smale, 2017), limited attention has been given to practical solutions. Although publicly available performance data has guided seed selection elsewhere (Torshizi & Gray, 2022), its impact in the African context remains largely unexamined. To our knowledge, this is the first study to rigorously evaluate the impact of performance data on maize seed selection in this context.

Slow varietal turnover is influenced by multiple factors, including limited access to reliable performance information, risk aversion, supply chain inefficiencies, and marketing practices favoring well-known varieties. Addressing this issue requires a comprehensive approach that combines accurate information dissemination with strategies to mitigate risks and improve seed availability. Product performance information can play a crucial role in informing farmers about newer, better-adapted, and higher-yielding hybrids, supporting more confident decision-making.

Effective dissemination of performance data can be achieved through extension programs, points of sale, SMS, WhatsApp, and posters in public spaces. Given the importance of peer-to-peer information sharing, community engagement should also be prioritized to enhance trust and adoption rates. However, the effectiveness of these channels may vary depending on farmers' literacy levels, technological access, and social networks. Therefore, further research is needed to identify the most cost-effective and impactful methods for different farmer demographics.

Establishing a robust third-party dissemination system could shift market dynamics from being driven by seed company marketing to focusing on product quality. Currently, dominant hybrids remain popular due to branding rather than actual performance. Increased transparency would enable farmers to identify superior varieties, regardless of brand, while motivating breeders to develop hybrids that consistently outperform their previous releases and competing products. This shift would foster competition based on quality, rather than marketing strength, ultimately ensuring that farmers have access to the best seed options suited to evolving agricultural conditions.

However, achieving this transformation requires addressing several key challenges. First, standardized protocols for unbiased varietal performance testing must be institutionalized to ensure data quality and objectivity. These protocols should reflect the conditions under which smallholder farmers operate, rather than relying solely on data from optimal agronomic trials. The yield potentials promoted by seed companies are often based on trials conducted under optimal agronomic conditions, which may not align with the realities faced by smallholder farmers. For example, (Kitoto et al., 2024) showed that farmers expect less than half of the seed company reported yield potential in an optimal season and only a quarter under stressful conditions. Second, performance data should include additional farmer-relevant information beyond yield, such as drought tolerance, maturity periods, and pest resistance, which are critical factors influencing seed choices. Nevertheless, care must be taken to avoid overwhelming farmers with excessive information, which could complicate decision-making.

Third, seed supply chains need to be strengthened to ensure that high-performing varieties are consistently available to farmers when needed. Supply shortages can undermine the impact of performance data by limiting farmers' ability to act on the information they receive. Collaboration among seed companies, government agencies, and development organizations is essential to improve production, distribution, and access to high-quality seeds.

To support this transformation, we recommend: (1) institutionalizing standardized product testing to ensure data quality and objectivity, (2) expanding the scope of performance data to include additional farmer-relevant traits, (3) developing innovative marketing and outreach strategies tailored to different farmer demographics, (4) strengthening seed supply chains to improve the availability of high-performing varieties, and (5) enhancing farmers' capacity to interpret and apply performance data through targeted training and extension services. These efforts will collectively contribute to increased agricultural productivity, resilience, and improved livelihoods for maize farmers in Kenya and beyond.

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Appendix: Treatment scripts and Information sheets

Seed product performance information in Embu County

Name of seed product	Age	Bags per acre – County average	Bags per acre – top 25% of farmers
PRODUCT 1	7	13	25
PRODUCT 2	4	11	22
PRODUCT 3	10	8	14
PRODUCT 4	48	7	14
PRODUCT 5	26	7	11
PRODUCT 6	27	7	11
PRODUCT 7	19	7	11
PRODUCT 8	16	6	13
PRODUCT 9	19	6	11
PRODUCT 10	7	5	8

Seed product performance information in Kirinyaga County

Name of seed product	Age	Bags per acre – County average	Bags per acre – top 25% of farmers
PRODUCT 1	4	13	27
PRODUCT 2	7	10	20
PRODUCT 3	48	10	21
PRODUCT 4	10	10	17
PRODUCT 5	21	9	16
PRODUCT 6	19	9	15
PRODUCT 7	21	9	14
PRODUCT 8	27	8	14
PRODUCT 9	19	8	14
PRODUCT 10	16	8	13

Figure A.1: Information sheets

Some fun facts about farming in Kenya and about Kenya in general

- Did you know that Agriculture is the main backbone of Kenya's economy?

Agriculture employs almost half of the working population in Kenya!!!

- Kenya's main agricultural products include maize, sugarcane, tea, coffee, and horticulture.

- Maize and sugarcane are mostly grown for domestic markets
- Major agricultural exports in Kenya include tea, coffee, and horticulture.

Did you know that Kenya is home to the second highest mountain in Africa? Yes, Mt Kenya is the second highest mountain in Africa, after Mt Kilimanjaro.

- Did you know that the Great Rift Valley was formed more than 25 million years ago, yes it is indeed that old.

Figure A.2: Information control

Appendix 3: Treatments and information implementation scripts used in the study

TREATMENT IMPLEMENTATION

Note to the enumerator: Enter the farmer unique index to determine the group they will fall in (either comparison or treatment). Then use the respective text below to take them through the information for that group.

Group 1 – Comparison group

There are lots of options when it comes to selecting the right maize seed products for your farm. However, there isn't always good information on the differences between these products.

One of the best ways to find the best product for you is to experiment – that is, you buy one bag of a product you haven't used before, and you experiment with it in a small section of one of your maize plots. You monitor the experimental plot of the season and observe its performance and compare its performance to the products that you normally use.

Maize seed products can differ in several ways, to include: maturity rate, year of release and price.

We encourage you to experiment with a product that you have not grown before. To support your experimentation, I will offer you a voucher to purchase one 2kg bag of maize seed today at this agrovet shop.

Here is the voucher for use at the shop to purchase one 2kg bag of maize seed. The voucher is yours and you are free to choose whichever maize seed product you wish to buy. Please note that the voucher can only be used during this visit. You may not transfer to another farmer.

Note to the enumerator: Make sure you have given the farmer a voucher before you proceed and that the farmers understands what to do with it.

I also would like to share with you some fun facts about farming in Kenya and about Kenya in general.

- Did you know that Agriculture is the main backbone of Kenya's economy?
- Agriculture employs almost half of the working population in Kenya!!!
- Kenya's main agricultural products include maize, sugarcane, tea, coffee, and horticulture.
- Maize and sugarcane are mostly grown for domestic markets
- Major agricultural exports in Kenya include tea, coffee, and horticulture.
- Did you know that Kenya is home to the second highest mountain in Africa? Yes, Mt Kenya is the second highest mountain in Africa, after Mt Kilimanjaro.

- Did you know that the Great Rift Valley was formed more than 25 million years ago, yes it is indeed that old.

Group 2 – Treatment – information group
There are lots of options when it comes to selecting the right maize seed products for your farm. However, there isn't always good information on the differences between these products.

One of the best ways to find the best product for you is to experiment – that is, you buy one bag of a product you haven't used before, and you experiment with it in a small section of one of your maize plots. You monitor the experimental plot of the season and observe its performance and compare its performance to the products that you normally use.

Maize seed products can differ in several ways, to include: maturity rate, year of release, price.

We encourage you to experiment with a product that you have not grown before. To support your experimentation, I will offer you a voucher to purchase one 2kg bag of maize seed today at this agrovet shop.

Here is a voucher that you can use at the shop to purchase one 2kg bag of maize seed. The voucher is yours and you are free to choose whichever maize seed product you wish to buy. Please note that the voucher can only be used during this visit. You may not transfer to another farmer.

Note to the enumerator: Make sure you have given the farmer a voucher before you proceed and that the farmers understands what to do with it.

Now, before you visit the shop, I want to share with you important information on seeds products that **might** be available in this agrovet shop. This information was reported by farmers from this county and collected and analyzed by CIMMYT. CIMMYT collected the yield data that was reported by farmers – we did not support farmers in any way in their maize production.

Here is a table with information on maize seed products that were grown by farmers from this county during the long-rain season of March – June 2023. The table shows you how each of those products performed in terms of yield. It also shows you the age of each seed product, in other words, the number of years the product has been in the market.

If you wish, you can use the voucher to get one bag for experimentation from the list.

Note to enumerator: Give the list to the farmer

The list you are holding shows you the following information about maize seeds:

- First, it shows you name of the product
- Then the years it has been in the market
- Then the yield (in number of bags) the farmers obtained per acre

- Then it shows you the number of bags the top 25% farmers who got the highest yields got – this is to show you the full potential of the product

I now request you to have a keen look through the list before you go inside the shop and see if you find any information that might help you in choosing the maize seed you want to experiment with.

Note to enumerator:

1. *Allow the farmer to take any notes if they want. Strictly, do not allow the farmer to make a copy or take a picture of the information sheet*
2. *once the farmer you have gone through the information sheet with the farmer, invite them into the agrodealer shop to make their purchases. Remind them to return to the tent once they have done the purchase for and exit interview. Do not give any hint what the exit interview will be about.*