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RESEARCH ARTICLE

Informational nudges with adverse effects

[version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

We present a survey-based intervention through an informative nudge on Agroecological Weed Management (AWM). Data are based on 405 responses by European farmers. An adverse effect of the informational nudge is found. Learning the consequences of the desired practice may nudge the farmer against rather than in favor of adopting it. The effect depends on the current practices adopted, the farmer's experience, education, age and gender.

Keywords

Informative Nudges; Agroecology; Weed Management; Sustainability; Herbicides

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Introduction

Since the book by Thaler and Sunstein[1], the concept of nudging has gained increasing attention in behavioural economics and public policy and the environmental and agricultural domains[2,3], offering an alternative to traditional regulatory or financial incentives. Nudges are defined as "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives"[1, p. 6]. Nudges can be considered ethical insofar as they preserve individual autonomy while aiming to correct behavioural market failures[4].

With the demand for green solutions on the rise, many EU projects[i] and initiatives explicitly address the *efficacy* and *efficiency* of Green Nudges as a means of enhancing the adoption of Green Practices in agriculture and forestry. Efficacy refers to the achievement of the intended behavioural shift towards the desired practice by a specific nudge, while efficiency imposes further desiderata like low implementation costs and compliance with specific ethical rules. Ethics-related desiderata call for a cautious attitude towards manipulative nudges which target automatic or subconscious reactions (System 1) by the decision makers, rendering them passive and unaware receptors of the intervention. In the opposite case, nudges which make the decision maker aware of the intervention and its objectives can be considered more desirable, as they achieve their objectives through the activation of more explicit cognitive processes (System 2) leading to the conscious and presumably long-lasting adoption of the desired practices.[ii] This note reports on a nudge with adverse effects, arguing that informative nudges and information in general may hinder the adoption of the desired (green) practice. Furthermore, it opens the black box of the contextual and individual sources of such adverse informational effects.

The global shift toward sustainable food systems has pushed agroecology as a key lever for the agricultural industry. However, the transition towards agroecological practices often places farmers at the centre of a trade-off: on one hand, the moral call to adopt environmentally responsible practices; on the other, the economic and practical risks associated with deviating from conventional farming methods. Ethical tensions may arise when transition to agroecological practices is pushed in the light of social and political pressure, without adequately addressing the farmers' structural constraints and value systems[5,6].

Informational nudges represent a significant subset of behavioural interventions[7]. These nudges appeal to System 2 thinking, promoting more reflective and deliberate choices[8]. They differ from System 1 nudges, which often rely on affective or subconscious stimuli[9]. Informational nudges are often applied in domains where it is crucial to increase awareness, such as sustainability and pro-environmental behaviours[10,11]. The efficacy of informational nudges may depend on individual and contextual factors. Socio-demographic characteristics of farmers such as age, education, and gender have been shown to influence receptiveness to sustainability messages[12]. Likewise, farm characteristics like size or farming system has shown to affect how farmers interpret and act upon information[13].

While specific nudging interventions have been successful in many fields, their success in agricultural contexts has not always been straightforward. As farmers base their decisions on a combination of rational, habitual, social, and emotional factors, informational nudges may lead to unintended consequences or boomerang effects[7,14].

Methodology

Data collection

This study analyses data collected from a haphazard sample of farmers across eight countries in Europe—Greece, Cyprus, Italy, Spain, Portugal, Serbia, Latvia, and the Netherlands—through 16 Living Labs involved in farming activities on the following crops: apple, grapes, plum, cherry, citrus, legumes, maize, olives, onion, rice, rye, peas, soybean, triticale and winter wheat (see Appendix A in Extended Data, including the questionnaire of this study). A total of 405 observations were collected through a survey by questionnaire (ethical approval CERBSB2023-56). Informed consent for participation in the study was obtained, and individuals who indicated that they did not wish to take part in the survey were automatically screened out (see Appendix A, Q1 in Extended data). The part of the questionnaire analysed for this study included two sections.

The first section focused on socio-demographic characteristics of farmers (age, gender, education, year of experience in farming), farm structure and farming methods. Table 1 describes the sample according to these characteristics.

The second part of the questionnaire explored farmers' intention to reduce herbicide use and adopt AWM practices in the short and long term[iii]. Then a brief informational paragraph was introduced as a nudge, providing additional details about AWM (see Appendix A, Q9 in Extended data).

After reading this information, farmers were presented with the same statements on their intention to adopt AWM practices.

Econometric analysis

The first part of our analysis employs the Wilcoxon Signed-Rank Test to compare farmers' stated intentions to adopt environmentally sustainable practices before and after the nudge

[i] ForestAgriGreenNudge (https://greennudge.eu/) and PRUDENT (https://prudent-project.eu/) are exclusively dedicated to the application of Green Nudges.

[ii] Earlier than their 2008 Book, Thaler and Sunstein (2003) provided insightful discussion on the implications and trade-offs involved in Libertarian Paternalism, the foundational concept underlying nudging interventions.

[iii] Specifically, farmers were asked to express their level of agreement (through 7-point Likert scales) to three statements adapted from Despotović *et al.*[15] as follows: 1) I plan to reduce the use of herbicides this year; 2) I intend to reduce the use of herbicides over the next 5 years; and 3) I will regularly try to reduce the use of herbicides in the future.

Table 1. Socio-demographic and farming characteristics of the sample (n=405).

Variables	Mean (Std. Dev.)	Min	Max
Male	0.81	0	1
Age (in years old)	50 (13.14)	24	84
Education			
Up to secondary school degree	0.23	0	1
High school degree	0.33	0	1
University degree	0.44	0	1
Conventional farming methods	0.63	0	1
Years of activity	20.9 (18.9)	1	124
Family labor in farming	1.55	0	6
Farming methods (hectares)			
Conventional farming	28.83 (122.41)	0	1,800
Conventional under transition	1.47 (12.66)	0	215
Organic	17.32 (101.73)	0	1,205
Biodynamic	1.87 (34.92)	0	700
Regenerative	5.16 (61.89)	0	1,000
Agroecological	2.38 (35.14)	0	700
Other	2.42 (31.17)	0	600
Production destination			
Cropland	29.32 (110.19)	0	1,283
Permanent crops	8.39 (26.55)	0	290
Permanent grasslands	13.11 (81.81)	0	1,100
Other	3.21 (51.07)	0	1,000

intervention, both in the short-term and long-term periods. This approach allows us to assess whether the intervention led to statistically significant changes in intention levels, without making distributional assumptions about the data. In addition, we perform subgroup analyses based on farmers' sociodemographic characteristics (age, gender, education) and farm characteristics (farming methods, family business status, and years of activity) to explore potential heterogeneity in responses to the intervention.

In the second part of our analysis, we estimate two ordered probit models in which the dependent variables are intention to reduce herbicides and adopt AWM practices in the short term, before and after the nudge.

Our general specification for the intention models is given by:

$$y_{ij}^{*} = a_{\mathrm{j}} + \beta X_i + \gamma Z_i + e_i,\ j \in \{1,2\} \quad (1)$$

where y_{ij}^{*} is a latent continuous variable representing farmer i's intentions regarding outcome j: reducing herbicide use (j = 1) or adopting AMW practices (j = 2). The vector X_i includes socio-demographic characteristics (age, gender and education), and Z_i captures farm characteristics (farming methods, family business status and years of activity). The error term e_i is assumed to follow a standard distribution. The observed ordinal outcome $Y_{i,j} \in \{1,...,7\}$ is linked to the latent variable y_{ij}^{*} via a set of threshold parameters, consistent with the ordered probit framework.

Results

Are informational nudges an effective tool for promoting herbicide reduction and adoption of AWM practices?

The results of Wilcoxon Signed-Rank Tests show a significant decline in short-term intention following the nudge (Table 2). In contrast, long-term intentions remained stable. Similarly, general future-oriented intentions showed no difference in mean values before and after the nudge, with medians remaining at 7 and no significant difference detected. These results suggest

Table 2. Differences in Farmers' Short- and Long-Term Intentions to Adopt Sustainable Practices Before and After the Nudge.

Short term farmers' intentions	Mean (std.dev.)
Before nudge: I plan to reduce the use of herbicides this year	5.18 (2.21)
After nudge: I plan to use Agroecological Weed Management practices this year.	4.91 (2.11)
Wilcoxon test for pre-posttest in intentions: Mdn_before=7; Mdn_after=5 W=3.109; p=0.01	
Long term farmers' intentions	
Before nudge: I intend to reduce the use of herbicides over the next 5 years.	5.45 (1.96)
After nudge: I intend to use Agroecological Weed Management practices over the next 5 years.	5.43 (1.81)
Wilcoxon test for pre-posttest in intentions: Mdn_before=7; Mdn_after=6; W=0.916, p>0.10	
Before nudge: I will regularly try to reduce the use of herbicides in the future	5.64 (1.89)
After nudge: I will regularly try to introduce Agroecological Weed Management practices in the future.	5.64 (1.72)
Wilcoxon for pre-posttest in intentions Mdn_before=7; Mdn_after=7; W= 0.536, p>0.10	

that the informational nudge had a statistically significant, negative effect on intention to apply AWM in the short run, but no observable impact on intention in the long term.

What is the influence of socio-demographic and farm characteristics on behavioural response to informational nudges?

In order to answer RQ2, Wilcoxon tests were conducted to determine whether there is a statistically significant improvement between pre- and post-nudge intentions to implement AWM practices, based on farmers' socio-economic characteristics and farm characteristics (Table 3).

The results reveal that farmers who practice sustainable farming, have higher levels of education, are younger, and have fewer years in this economic activity reduce their intentions to adopt AWM after the nudge. These differences are only observed in short-term intentions. When looking at long-term intentions, there are no significant differences before and after the informative nudge.

Ordered probit models were applied to highlight the role of socio-demographic characteristics of farmers and farming practices in influencing intentions to reduce the use of herbicides and apply AWM practices in the short term (Table 4).

Table 3. Pre- and post-nudge intentions to reduce herbicide use and adopt AWM in the light of socio-demographic and farming characteristics.

Variables	Mean (St. Dev.)	Wilcoxon signed-rank test for pre-post test in intentions z	Obs.
Farming methods			
If conventional farming			
Before	4.38 (2.211)	1.838	249
After	4.09(1.990)		
If sustainable farming			
Before	6.45 (1.529)	3.354***	157
After	6.21 (1.585)		
Farmers' education			
If university degree			
Before	5.33 (2.150)	2.774***	181
After	4.97 (2.130)		
If college degree		1.204	132
Before	5.21 (2.255)		
After	5.07(2.066)		
If secondary school diploma			
Before	4.86 (2.282)	1.244	93
After	4.55 (2.123)		
Farmers' gender			
If women			
Before	5.87 (1.958)	2.429**	74
After	5.47 (2.021)		
If men			
Before	5.03 (2.245)	2.506**	331
After	4.77 (2.114)		

Variables	Mean (St. Dev.)	Wilcoxon signed-rank test for pre-post test in intentions z	Obs.
Farmers' age			
If ≤50 years-old			
Before	5.43 (2.069)	3.582***	211
After	4.99 (2.056)		
If >50 years-old			
Before	4.92 (2.343)	0.674	195
After	4.82 (2.173)		
Years of activity			
If ≤16 years			
Before	5.68 (1.965)	3.265***	204
After	5.27 (1.983)		
If >16 years			
Before	4.68 (2.347)	1.066	202
After	4.54(2.178)		
Family business			
Yes			
Before	5.01 (2.247)	2.226**	343
After	4.81 (2.112)		
Non			
Before	6.11 (1.797)	2.750***	63
After	5.41 (2.052)		

Note: **, *** indicate significant improvement at 5 and 1 percent levels respectively.

Table 4. Ordered probit model on the determinants of farmers' intentions.

Variables	I plan to reduce the use of herbicides this year		I plan to adopt AWM practices this year.	
	Coef.	z	Coef.	z
Age	0.000	0.11	0.002	0.59
Male	-0.428	2.57***	-0.252	1.67*
Conventional farming	-1.12	8.58***	-1.27	9.86***
Family Labor	-0.532	2.78***	-0.39	0.24
College	-0.064	0.40	0.090	0.50
University	-0.090	0.59	0.090	0.60
Years of business activity	-0.416	2.89***	-0.281	-2.10***
Log Likelihood		-556.814		-637.98
Pseudo R2		0.103		0.09
Number of obs.		405		405

Note: *, ***, ** indicate significant improvement at 10, 5 and 1 percent levels respectively

Male farmers are significantly less likely to plan a reduction in herbicide use compared to female farmers. Similarly, those engaged in conventional farming practices are substantially less inclined to reduce herbicide use. Family businesses also seem to be less likely to reduce herbicides, while farmers' age and education do not show significant effects. More years of business activity are negatively associated with the intention to reduce herbicides, suggesting that more experienced farmers may be less inclined to change their weed management strategies.

In contrast, when examining intention to adopt AWM practices, conventional farming again shows a strong and significant negative association. While the coefficient for male farmers remains negative, it is only marginally significant. The influence of family labor, though negative, is not statistically significant in this model. Education and age continue to show no significant effects. However, the number of years in business again presents a significant negative relationship, indicating a consistent reluctance among more experienced farmers to adopt AWM practices. The overall model fit, as measured by Pseudo R^2, is slightly lower for the AWM adoption model (0.09) compared to the herbicide reduction model (0.103).

Conclusions

The contribution of this paper to the debate on the efficacy of otherwise desirable informational nudges is twofold. First, informational nudges may have an adverse effect, hindering the adoption of the desired green practice. Second, the adverse effect depends on the decision-maker's characteristics and past farming decisions. Thus, information provision is not *per se* an effective means of changing behaviour in favour of more sustainable practices. In fact, these practices represent only one subset of possible actions that farmers might consider adopting and the interaction between preexisting and new green practices has been shown to reduce or reverse the effect of a green informational nudge. Whether this finding represents a local or a global shortcoming of informational nudges remains an open question. Future research should investigate whether transparent communication about both the benefits and costs of green practices can foster more deliberate, conscious adoption of sustainable methods, moving beyond the idea of behavioural change as a simple reaction to nudges, and toward a more holistic and informed decision-making process. However, the nudging failure reported here stands as strong evidence of efficacy-ethics trade-offs emerging under transparent and informationally loaded behavioural interventions.

Ethics and consent

Ethical approval was granted by the Ethics Committee of the Burgundy School of Business on June 28th 2023 (CERBSB2023-56). Informed consent was obtained electronically at the beginning of the online questionnaire.

Data availability

Underlying data

This project contains the following underlying data:

Zenodo: Intention to adopt Agroecological Weed Management practices. (Database) https://doi.org/10.5281/zenodo.17225013[16]

Extended data

This project contains the following extended data:

Zenodo: Appendix A, paper "Informational nudges with adverse effects". (Appendix A, survey questionnaire)

https://doi.org/10.5281/zenodo.17338823[17]

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

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✓ **Nicolas Depetris Chauvin**
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This research note investigates the efficacy of informational nudges in promoting Agroecological Weed Management (AWM) among a sample of 405 farmers across eight European countries. The study employs a pre-test/post-test survey design to measure farmers' intentions to reduce herbicides (pre-nudge) versus their intentions to adopt AWM practices (post-nudge) after reading a specific informational paragraph.
The authors report a counter-intuitive and highly relevant finding: the informational nudge produced an "adverse effect" in the short term, statistically reducing the intention to adopt the practice. This effect was most pronounced among younger, highly educated farmers and those already practicing sustainable farming. The authors conclude that transparency regarding the complexity of green practices may trigger deliberate (System 2) cost-benefit calculations that hinder immediate adoption.

General Assessment This is a very interesting and timely project. The application of behavioral economics to the agricultural sector is of high value to policymakers, and the authors are to be commended for publishing "negative" results. The finding that information can boomerang is a crucial contribution to the literature on the "efficacy-ethics trade-off."
The manuscript is concise, the statistical analysis is rigorous (appropriately using non-parametric tests for ordinal data), and the engagement with current literature is excellent. However, there are aspects of the study design regarding the comparability of the pre- and post-nudge questions that require further discussion to ensure the interpretation of the results is robust.

Specific Comments & Suggestions
I have answered "Partly" to the questions regarding Study Design and Conclusions. Below, I detail why, and provide suggestions on how the authors can address these points to strengthen the manuscript.

1. Major Comment: Construct Comparability (Study Design)
The core of the analysis rests on comparing the "Pre-nudge" intention score with the "Post-nudge" intention score. However, looking at the questionnaire (Appendix A), the constructs measured are

slightly different:

- Pre-Nudge (Q8): Asks about the intention to "reduce the use of herbicides." (The Goal)
- Post-Nudge (Q10): Asks about the intention to "use Agroecological Weed Management (AWM) practices." (The Method)

While these are related, they are not synonymous. A farmer may maintain a strong desire to reduce herbicides (High score on Q8) but, after reading the nudge, disagree with the specific definition of AWM provided in Q9 (Low score on Q10). Therefore, the drop in score might not be a rejection of the goal (sustainability), but a realization that the specific method (AWM) is not feasible for them. The score could easily have dropped because the second question may be harder to agree with than the first question. What would have happened if the authors have asked before the nudge the question "do you want to use AWM?". Perhaps the score would have been low to start with.
Suggestion for the Authors: Consider adding a paragraph in the Methodology or Discussion acknowledging this shift in construct. It would be valuable to discuss whether the "adverse effect" might be interpreted as a "reality check" where farmers realize that while they want to reduce herbicides, they cannot commit to the specific labor-intensive list (grazing, mowing, mechanical control) provided in the nudge.

2. Major Comment: The Content of the Nudge
Currently, the text of the nudge is located in the Extended Data (Appendix A, Q9). Because the specific wording of the nudge is the central independent variable of the study, it is difficult for the reader to evaluate the results without seeing it immediately.
Suggestion for the Authors: Please move the full text of the informational nudge (Q9) from the Appendix into the Methodology section of the main paper. Furthermore, the nudge text lists several labor-intensive practices (e.g., mechanical control, grazing, mowing). This supports your conclusion that "System 2" thinking was activated. The farmers likely calculated the immediate labor costs of these specific examples. highlighting this link between the specific words in the nudge and the characteristics of the farmers who reacted negatively (e.g., business-oriented, educated farmers) would strengthen the Discussion.

3. Minor Comment: Control Group
The study uses a one-group pretest-post test design. Without a control group that took the survey without the nudge, it is theoretically possible that the drop in scores is due to survey fatigue or other external factors. Suggestion: While new data cannot be collected, please briefly mention this limitation in the conclusion. However, given that the "Long Term" intentions remained stable while "Short Term" dropped, the effect does appear to be genuine rather than an artifact of fatigue.

4. Minor Comment: Statistical Reporting
The use of the Wilcoxon Signed-Rank Test and Ordered Probit models is excellent and well-suited for Likert-scale data. The reporting in Tables 2, 3, and 4 is clear. Suggestion: In Table 2, clarifying whether the comparison is between Q8-Item1 vs Q10-Item1 would be helpful for absolute clarity, given the change in wording discussed above.

Conclusion
This paper makes a meaningful contribution by highlighting that "more information" is not always better in environmental policy. With the inclusion of the nudge text in the main body and a nuanced discussion regarding the difference between "reducing herbicides" and "adopting AWM," this paper will be scientifically sound and highly informative.

Final thoughts beyond the strict scope of the paper:
Reading this paper brings to mind the broader debate in agricultural development regarding "Complementary Inputs." The "adverse effect" found here aligns with the theory that information alone cannot succeed if structural constraints (the "complements" such as labor availability, access to credit for machinery, or insurance) are binding.
The nudge listed labor-intensive practices (mowing, mechanical control). The fact that business-oriented and educated farmers reacted negatively suggests they may have identified a lack of these complementary inputs (e.g., lack of labor force) required to act on the information.
It would be a valuable addition to the Conclusions or Future Work section to mention that informational nudges may need to be coupled with structural support (complements) to avoid this "boomerang" effect. Information highlights the path, but without the necessary resources (labor/capital) to walk it, the rational decision is often to reject the practice.

Is the work clearly and accurately presented and does it engage with the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

Are all the source data and materials underlying the results available?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: trade; development; agricultural economics; wine economics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 25 November 2025

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Durgesh Kumar Jaiswal
Graphic Era Deemed to be University, Dehradun, Uttarakhand, India

The manuscript investigates whether an informational (System 2) nudge about Agroecological Weed Management (AWM) alters European farmers' intentions to adopt AWM or reduce herbicide use, using a single-group pre–post questionnaire administered across 16 Living Labs in eight countries (n=405). Short-term intention to apply AWM decreases after exposure to the vignette, while long-term intentions remain unchanged; subgroup analyses and ordered probit models indicate heterogeneity by education, gender, current practice, and experience. Data and an appendix with the questionnaire and vignette are shared on Zenodo, enabling analytic replication of the intention outcomes, though implementation and code details are not fully specified in the main text.
The manuscript will be publishable after revision that clarifies causal language, strengthens methodological reporting, and aligns interpretations with design limitations.

- The abstract and discussion use causal language ("adverse effect," "nudge against adoption") in a single-group, non-randomised, intention-based design, which risks over-interpretation. Without a control condition or randomization, changes could reflect demand characteristics, salience, regression to the mean, or measurement artefacts rather than a true causal effect of the nudge.
- Page 1, Abstract, lines ~10–16: Rephrase to "short-term stated intentions decreased following exposure to an informational vignette; no change in long-term intentions" and avoid "adverse effect" unless clearly qualified as "in stated intentions".
- Page 4, Results, lines ~5–13: Replace "negative effect" with "decrease in short-term stated intentions post-vignette" and add a sentence noting the absence of a control group and the exploratory nature of inference.
- The methodology acknowledges a "haphazard" Living Lab sample but does not fully discuss threats to internal validity (no control group, possible order/demand effects) and external validity (convenience access) in the main text.
- Page 3, Methodology, Data collection, lines ~1–20: Add explicit limitations on sampling, recruitment, response rates, and representativeness; specify inclusion/exclusion criteria and survey mode/timing across sites.
- Page 7–8, Insert a limitations paragraph covering internal validity (no randomization/counterfactual), measurement (Likert intentions), and lack of behavioral outcomes or follow-up.
- Wilcoxon tests and ordered probit are appropriate for ordinal intentions, but effect sizes, confidence intervals, clustering by country/Lab, and multiple-testing adjustments are not reported, risking Type I error and overstated precision.
- Tables 2–3: Add effect size metrics (e.g., matched-rank biserial r) and 95% CIs for median or distributional shifts; present Hodges–Lehmann estimates for pre–post differences.
- Ordered probit (Table 4), Report marginal effects with 95% CIs; re-estimate with cluster-robust SEs at Lab or country level; add sensitivity with ordered logit and alternative scale codings; adjust for multiple comparisons in subgroup tests (e.g., Holm) and state the correction used.
- Page 4, Econometric analysis, lines ~25–32: State pre-specified primary outcomes and the handling of multiple hypotheses; if post hoc, label as exploratory.
- Data and Appendix A are on Zenodo, but procedural replication is constrained by limited detail on recruitment scripts, response rates, site timing, and exact vignette delivery/context in the main text.

- Page 3, in Data collection, Add recruitment channels, response rate per site, eligibility criteria, incentives (if any), and survey mode (in-person/online).
- Page 3, last paragraph: Include the precise vignette text or a condensed version in main text with a pointer to Appendix A; specify whether any randomization/counterbalancing occurred.
- Provide a public codebook and minimally a reproducible script (e.g.,. do/.R/.py) linking raw variables to analysis datasets and tables; cite in Data availability.
- Conclusions imply that information can hinder adoption; results support a short-term decrease in stated intentions and no change in long-term, which is narrower.
- Page 7–8, In Conclusions, Limit claims to short-term intentions; add that real-world behavioral deterrence is untested here and propose future randomized or field experiments with behavioral outcomes and follow-up.
- The introduction frames System 1 vs. System 2 and cites boomerang effects, but could better integrate recent agri-sustainability nudging literature and mechanisms (reactance, perceived risk, norm conflict) to explain heterogeneity.
- Page 2–3, Briefly synthesize recent meta-analyses and field experiments on informational nudges and backfire in agriculture; link observed subgroup patterns (e.g., higher education, sustainable farmers) to hypothesized mechanisms such as reactance or risk salience.
- Page 6–7, Map vignette elements to mechanisms and articulate testable predictions for future RCTs (message framing, losses vs. gains, social norms, efficacy cues).
- Page 1, Abstract, and throughout: Use consistent phrasing for outcomes (“short-term stated intention to apply AWM” vs. “reduce herbicide use”) and clarify that pre- and post-items differ slightly in wording (reduce herbicides vs. apply AWM), which may itself influence responses; acknowledge as a measurement limitation.
- Tables 2–3, Standardize labels, add notes explaining item wording differences pre vs. post, and mark which comparisons survive multiplicity correction.
- Page 2, Already reported; consider adding data protection statements if any personal data was handled and how anonymisation was performed.
- Reframe causal language to descriptive, intention-based phrasing in the abstract and conclusions.
- Report effect sizes with CIs; use cluster-robust SEs; document multiple-testing adjustments; provide model sensitivity checks.
- Provide codebook and an analysis script or detailed workflow to enable computational reproducibility; cite in Data availability.

Is the work clearly and accurately presented and does it engage with the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

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Are all the source data and materials underlying the results available?
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If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Agro-microbial-biotechnology; Plant-microbe intraction, sustainable Agriculture

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.