# Editor comments

Editor comments:

The comments from both reviewers are highly important and substantial. Please address all of their comments except the second reviewer's concern about lack of calibration and validation of model against experimental data. I will accept the manuscript if you can address all other comments and as long as you can strongly justify that further calibration and validation is not necessary.

Response:

# Reviewer 1 comments

Reviewer #1:

Title: Risk-based evaluations of competing agronomic climate adaptation strategies: The case of rice planting strategies in the Indo Gangetic Plains  
  
This study employs a crop modeling approach to evaluate diverse climatic adaptation strategies for rice and wheat farmers in the Indo-Gangetic Plains (IGP). The Methodology and Results sections are presented clearly. The authors also demonstrate considerable effort in this study. However, some points need to be addressed to enhance the comprehensibility and applicability. Below are specific comments.  
  
1.The uploaded includes the draft of the manuscript. Please submit the latest version for review.

Response:

2. A few suggestions on citations are suggested.

1)When citing multiple sources simultaneously, it is better to place them chronologically (L64-65, L248).

2)Using "and" to connect authors' names is more appropriate than using a semicolon (;) when citing multiple sources (L73).

3)When the number of authors exceeds two, "et al." can be used for simplicity (L49-50, L70-71, L72-73, L90-91).

4)The citation at the end of sentence should be enclosed in brackets such as (IPCC, 2022) in L42.

5)In the APA style, in-text citations consist of the author's name followed by the year in brackets, such as Meyer (1977) (L158, L255, L455).

Response:

6)A comma is suggested between the author's name and published year (L403, L410, L445).

Response:

3.Regarding the study site, it is suggested to provide the rationale.

Response:

4.Please spell out the abbreviations for the first-mentioned terms, such as IGP for Indo-Gangetic Plains, to enhance the readability. (L22, L108).

Response:

5.It is suggested to refrain from using first-person pronouns (i.e., our, we) to maintain a neutral and objective tone (L143, L216, L225).

Response:

6.Several wordings can be revised to improve the clarity and comprehension.  
1)The phrase "so far" can be replaced with a more formal term, such as "until the present" or "up to date" (L89).  
2)The phrase "more" seems irrelevant and can be removed (L144).  
3)A hyphen is suggested to add for the phrases "risk averse" (L13, L18), "Indo Gangetic", and "long term" (L102).

Response:

7.There are several ambiguous statements that need to be clarified.  
1)This statement "…whether they are worse, better or worse, and better than…"? is unclear (L302-303).  
2)It is suggested to add a simple equation such as "Return/profit=Yield× Cost" (L138-142)  
3)The parameters G, F, and Q need to be clarified. Please briefly define these terms (L173).  
4)The abbreviations for the Scenario Numbers or Columns (S0-S6) should be provided for clarity (L264-275). Here is an example: "…long duration rice varieties at the monsoon onset (S3) …"; in L266, "For farmers practice (S0), …"; in L268, "Table 3: … with fixed long as baselines (S1)"; for L273-275: "Among the Scenario number S3-S1, planting…."  
5)The method for deriving the value of 78% from Table 5 needs to be explained in detail (L324).  
6)Please check the figure number (Figure 6 or Figure 7) in p. 65.

Response:

# Reviewer 2 comments

Reviewer #2:

Review report  
I have analyzed the "Risk-based evaluations of competing agronomic climate adaptation strategies: The case of rice planting strategies in the Indo Gangetic Plains" manuscript. The manuscript used computational spatial ex-ante and second order stochastic dominance approaches for risk-based evaluations. The manuscript requires revision to meet the publication standards. The major shortcoming are:  
\* This manuscript lacks validation where the proposed results are compared against measured

Response: We already addressed this in the initial review.

\* Calibration and validation of APSIM is not sufficient, heavily dependent on the previous paper

Response: This is not the focus of the paper. The APSIM data is just used as case study of modelled results anyone can produce.

\* The mapping work is coarse and lacks 'uncertainty' mapping

Response: We can point to thousands of gridded model results published in Agricultural Systems and elsewhere are coase so that readers can focus on the key comparisons one is focusing on in the results.

The computational model is about using intertemporal uncertainty to produce robust estimates as such there is no uncertainty mapping needed. In locations where we can’t give an exact recommendations are areas where the uncertainty in the estimates are too high to make a robust recommendation.

\* The results are presented in a straightforward way but lack in-depth statistical analysis and critical interpretations of the data.

Response: We did not attempt to do any statistical analysis in this paper. This paper uses an optimization model which is an approach different from the statistical approach.

\* There is a risk of circular reasoning as the paper relies too heavily on datasets or methods from the same research groups published already

Response: We don’t understand what the reviewer means by circular reasoning. The contribution is about the method of risk evaluation regardless of the data source. We use the data and application we are familiar with. If you have dataset this could be used as we said before you can provide it. This is trivial to the main paper.   
  
**Other comments:**  
  
**Abstract:**  
\* The abstract lacks specific results, based on revised version (line 24-30), see what the results are??? Quantitative data or specific percentages is required to enhance clarity. The authors did not address this comment as was identified in earlier review also. This abstract promises a framework but does not clarify what sets this framework apart from existing methods in a substantial way?

Response:

\* Rewrite Line 12-14: "However, choosing recommendations amongst competing levels of yield and yield stability is not straightforward and need to cater to farmers that are risk averse - especially financially." This sentence is not straightforward.

Response:

\* Line 17-18: "This framework allows development of climatic risk proof recommendations such that even risk averse farmers would find it profitable to adopt that strategy." The phrase "climatic risk proof" is misleading, as no strategy can be entirely risk-proof. This could overpromise the paper's deliverables.

Response: We thank the reviewer for the comment. We have added partially climatic risk proof recommendations to reflect that we may not capture some extremes in the APSIM model.

**Introduction:**  
\* The introduction section is not sufficient to describe the gap in the existing literature. It describes the problem and general approaches but fails to highlight the precise deficiencies that this study aims to address.

Response:

\* Provide more detailed justification of the chosen methodology, comparing it to other potential methods and explaining why it is preferred over other simple and easier methods?

Response:

\* The manuscript briefly described computational optimization and stochastic models and lacks depth description of how these models were calibrated and validated against actual measurements.

Response:

\* Line 41-43: The connection between 'climate change's impact on agriculture in low and middle-income countries and the specific focus of this paper is articulated'. Then, it jumped too quickly into the specifics without setting up a clear connection.

Response:

\* Line 41-45: The introduction fails to contextualize the research within the broader field adequately. Actually, this should have been the 'methodology comparison' paper. The specifics of how the study addresses the research gaps mentioned are missing.

Response:

\* Line 52-54: "The main aim of this paper is to develop a climatic risk proofing framework for making recommendations on rice sowing strategies in the IGP using evidence from crop growth models." The terminology "climatic risk proofing" again overstates the capabilities of the framework, provide more accurate framework 'name' to mitigate or manage climatic risks.

Response:   
  
**Materials and methods:**  
\* The description of the "golden section search algorithm" and "second order stochastic dominance" is overly technical without sufficient explanation for readers unfamiliar with these terms. Mentioned "Golden section search algorithm" without explaining why this method was chosen over others. A comparative analysis with other potential methods offers more credibility to the choice.

\* Clear, precise language is critical in scientific writing to avoid misinterpretation. Throughout the manuscript, there is excessive use of jargon that should be simplified.

\* The study lacks validation where the proposed results are compared against measured.

\* The manuscript does not clearly state the assumptions in the models, such as the independence of climatic events or the homogeneity of soil types across the study area, which are crucial for interpreting the results accurately.

\* How is the uncertainty of the mapping work? The authors are unable to present the uncertainty such as presented by 'Poggio, L., De Sousa, L.M., Batjes, N.H., Heuvelink, G.B.M., Kempen, B., Ribeiro, E., Rossiter, D., 2021. SoilGrids 2.0: Producing soil information for the globe with quantified spatial uncertainty. SOIL 7, 217-240. <https://doi.org/10.5194/soil-7-217-2021>' Present uncertainty map including robust statistical analysis including uncertainty measurements.

Response:

\* Line 131-133: "In this section, we showcase and explain our risk-assessment framework." This line could be more specific about what aspects of the risk-assessment framework are novel or distinct from existing frameworks? What makes this framework different or better than existing ones? More detail is needed here.

Response:

Response:   
  
**Results and discussion:**  
\* The results are presented in a straightforward way but lack in-depth statistical analysis (e.g., confidence intervals, sensitivity analyses).

Response: In the table, we presented results at the mean, min, max and different quartiles.

\* This manuscript lacks critical interpretations of the data and presents a one-sided view of the findings. Also, some claims are not fully supported by the data presented.

Response:

\* The figures and tables are under-explained in the text, making it difficult for readers to understand how they are related with the findings?

Response:

\* Unlike Newport et al. (2020), which utilizes detailed maps and regression models to demonstrate the impact of different sowing dates on wheat yields, the current manuscript lacks comprehensive visualization that could enhance understanding of the spatial and temporal dimensions of the data.

Response:

\* There is a lack of critical discussion comparing the proposed strategies with existing practices beyond the theoretical simulation and coding models. Insight into how these strategies could be implemented practically, considering local socio-economic conditions, is missing.

Response:

\* Line 243-247: The results are presented without adequate support from graphs or charts. The authors should compare their results critically with others considering the result of this and other studies.

Response:

\* Line 249: "Our results are in line with previous analyses..." lacks specificity. Which previous specific analyses and results and how? specify.

Response:

\* Line 243-247: The manuscript broadly mentions "quantitative evidence" without presenting specific statistical analyses that could substantiate the claims made.

Response: As explained above, this is an optimization model (also called computational model) not a statistical model.

\* Line 255-256: "While the results generally corroborate the findings from the previous crop simulations reported in (Urfels et al., 2022)..." Again, the authors did not respond the earlier comment adequately. Please specify what are the differences and novelties of this paper than Urfel et al., 2022??? There is a risk of circular reasoning as the paper relies too heavily on datasets or methods from the same research groups published already without external validation.

Response: We have presented evidence from Wang et al (2022) and Wang et al (2023) who used EPIC crop growth model and are not in our close or distant network. If we can make advances in other methods using the same set of data, we don’t think has risk of circular reasoning. The similarity is because the data is the same and though using different methods there are similarities in addition to the new results from the new method.

\* Line 416-418: "However, in the Northern and Southern parts of the Western and Middle IGP, we get produce substantially different outcomes - but also indicating that in these areas multiple rice planting strategies perform equally well..." This sentence is confusing and needs rephrasing for clarity. It should also clarify what "substantially different outcomes" means quantitatively and qualitatively???

Response:   
  
**Conclusions:**  
\* Some claims have not been fully supported by the data presented, causing the conclusion overstated. As the findings are context-specific, needs data well interpreted for adequately supporting the finding.

Response:

\* Throughout the manuscript, the terms "climatic risk proof" need reevaluation to ensure they do not overstate the findings.

Response:   
  
**Figures tables:**  
\* As commented in earlier version, APSIM model calibration process has yet to be clarified.

Response: APSIM calibration is the appropriate papers that we have substantially cited. If you feel those were inadequate then write a letter to the editors or authors of those published models not for this paper because the focus is on methods for assessing risk.

\* Pixel size of the figure is very coarse. What does it tell and what can be understood providing mapping result over the cities, forest and non-rice areas?

Response: As explained in the last review, mapping choices depend on the paper focus. There are thousands of GIS studies that map results of yields by state or district or pixel. This does not in any way mean everyone in that jurisdiction will get those yields. This comment doesn’t apply to our paper.