

Critical Review Statement

Advancing Reliable Climate-Smart Solutions for Farmers First Results from BASF's Global Carbon Field Trial Program

Commissioned by: BASF

Reviewer: Daniel Thylmann (Senior Sector Lead, Agriculture, Sphera)
Dr. Iris Matzke (Senior Manager, Consulting, Sphera)

Scope of the Critical Review

The review has been conducted on the document “*Advancing Reliable Climate-Smart Solutions for Farmers - First Results from BASF's Global Carbon Field Trial Program*”. The document is a technical report that describes the results of BASF's global carbon field trial program. While it uses LCA methodology to calculate the carbon footprint of the assessed crops (referred to as GHG intensity), the report is not intended to comply with the relevant standards such as ISO 14044:2006 and ISO 14071. Nevertheless, this review has been aligned with the general specification for LCA critical review processes set out in ISO 14071. **It is important to state that no compliance with these standards is claimed within this review process.**

In alignment with ISO 14044:2006, section 6.1 and ISO 14071, the goal of the Critical Review is to assess whether:

- The methods used to carry out the study are scientifically and technically valid,
- The data used are appropriate and reasonable in relation to the goal of the study,
- The interpretations reflect the limitations identified and the goal of the study, and
- The study report is transparent and consistent.

This review statement is only valid for the specific report titled “*Advancing Reliable Climate-Smart Solutions for Farmers - First Results from BASF's Global Carbon Field Trial Program*”, from August 2024.

Critical Review Process

The critical review was conducted between June 2024 (online kick-off meeting) and August 2024 (delivery of the final review statement). There was one formal round of comments on the draft version of the report together with an online meeting to discuss and clarify those comments. Exemplary inventory data, as used in the AgBalance model, was reviewed for two field trials. This review statement was issued after a review of the revised version of the report. The overall review was conducted in an equitable and constructive manner. All comments were addressed, and most of the highlighted issues were resolved.

General Evaluation

The technical report describes BASF's target of a 30% reduction in greenhouse gas (CO₂, N₂O, and CH₄) emissions per ton of crop produced by 2030 in wheat, soy, rice, canola, and corn. As a critical step to reach this target, BASF initiated a field trial program to assess practices that BASF can support farmers to reduce their greenhouse gas emissions.

The assessed practices are described clearly. The results of the field trials are summarized crop by crop, learnings and challenges are identified, and limitations are communicated. The results are provided transparently in the form of graphs, allowing the reader to assess the numbers behind the descriptions and the difference in results in different trials and different countries. In the final section of the report and with the final figure of the technical report (Figure 8), a summary of the results of all field trials is provided. Here, the report is transparent about the fact that the results of many field trials were not able to meet the BASF target of a reduction of at least 30% in the GHG intensity without negatively affecting crop yield (though many achieved a reduction in GHG intensity below 30% without compromising yields). The report discusses the potential reasons and the next steps foreseen to be investigated in the field trials. The used model (AgBalance) is described in an additional section (supporting information). The model follows state-of-the-art assessment approaches and underwent third party validation.

A limitation of the report is that there is very little communication about statistical testing and uncertainty assessment of the results. Only in the section on supporting information is it communicated that no statistical analysis was performed. It is challenging to conduct a detailed uncertainty assessment of complete LCA results of agricultural production systems due to the large number of influencing parameters. However, at least the results of a test of significance for the differences in yield could be reported (as such testing is commonly done in field trials). This could give more clarity to the results and potentially also classify some of the results in another result area (e.g., all results resulting even in small yield losses are classified in the "red zone" although it could be that these yield losses would not be observed under real conditions - the predictor if results would be replicable under real conditions is statistical testing).

Further recommendations for future updates are:

- The report concerns a carbon footprint of products with comparative assertions (alternative compared to baseline). Therefore, it would be appropriate to follow the respective ISO standards (mentioned above) to conduct, document and review such studies. This would increase the formal robustness of the study.
- In the supporting information it is made clear that no economic analysis is conducted, and potential revenue streams are not assessed due to the speculative nature of such assessments, which is a valid point. However, the main section contains strong statements about the necessity to avoid yield losses. This argument is probably made with the farmer's profit in mind, but there is no assessment of whether small losses in yield could be accepted if they are correlated to significant reductions in inputs, thus, costs and GHG intensity. This could be investigated (or at least communicated) as a potential scenario before any conclusions are made about limitations in the practical feasibility of alternatives that show small yield losses in combination with large GHG reduction potentials.

Conclusion

Sphera concluded that the methods used and documented in the report “Advancing Reliable Climate-Smart Solutions for Farmers - First Results from BASF’s Global Carbon Field Trial Program” are scientifically and technically valid. The report is considered sufficiently transparent and consistent. The data used are appropriate and reasonable in relation to the goal of the study, and the interpretations reflect the limitations identified. The main recommendations for future updates refer to statistical testing and transferring the study into an ISO compliant format.

Sphera’s statement refers to the full report provided by BASF (overview, technical report, and supporting information) and is only valid if all these sections are made available in combination to interested parties.

Sphera’s review does not imply an endorsement of the reports’ scope or results by the affiliated organization.

Daniel Thylmann
Senior Sector Expert, Agriculture
Sphera

Dr. Iris Matzke
Senior Manager, Consulting
Sphera

Valid as of September 5th, 2024