Review of: "Yield Forecasting Model for Maize Using Satellite Multispectral Imagery Driven Vegetation Indices"

José Germán Flores-Garnica[1]

1 INIFAP Instituto Nacional de Investigaciones Forestales Agricolas y Pecuarias

Potential competing interests: No potential competing interests to declare.

In general, the paper presents interesting information on the use of satellite imagery for the estimation of maize yield, for which it generates an equation based on NDVI. However, there are some aspects that could be improved to facilitate the understanding of the document. In this regard, the following specific observations are made:

1. The resulting equation and statistics supporting the correlation between NDVI and maize yield should be mentioned in the abstract.

2. The introduction should include an analysis of previous work on estimating maize yield from satellite imagery, since only mention is made of estimates of, for example, cereals in general, logging, wheat, and potatoes, but no mention is made of work on maize. In this regard, it is argued that there are very few specific studies on this topic in relation to maize, but even so, an analysis of these studies should be made.

3. This is important because the crops that are exemplified may have a reflectance different from that of maize, so works on the detection of maize crops using satellite images and the estimation of maize yield based on NDVI should be analyzed. This implies that bibliography on these topics should be included in the references. The following are some examples:

a. Silage maize yield estimation by using PlanetScope, Sentinel-2A, and Landsat 8 OLI satellite images. E Tunca, ES Köksal, SÇ Taner - Smart Agricultural Technology, 2023 – Elsevier.
b. Assessing within-field corn and soybean yield variability from WorldView-3, Planet, Sentinel-2, and Landsat 8 satellite imagery. S Skakun, NI Kalecinski, MGL Brown, DM Johnson… - Remote Sensing, 2021 - mdpi.com
c. Estimating maize biomass and yield over large areas using high spatial and temporal resolution Sentinel-2-like remote sensing data. M Battude, A Al Bitar, D Morin, J Cros, M Huc… - Remote Sensing of …, 2016 - Elsevier
d. Machine learning regression techniques for silage maize yield prediction using time-series images of Landsat 8 OLI. H Aghighi, M Azadbakht, D Ashourloo… - IEEE Journal of …, 2018 - ieeexplore.ieee.org
e. Forecasting maize yield at the field scale based on high-resolution satellite imagery. RA Schwalbert, TJC Amado, L Nieto, S Varela… - Biosystems …, 2018 - Elsevier
f. In-Season Prediction of Corn Grain Yield through PlanetScope and Sentinel-2 Images. F Li, Y Miao, X Chen, Z Sun, K Stueve, F Yuan - Agronomy, 2022 - mdpi.com
g. Developing maize yield predictive models from Sentinel-2 MSI derived vegetation indices: An approach to an early

warning system on yield fluctuation and food. MN Bazezew, AT Belay, ST Guda, C Kleinn - PFG–Journal of …, 2021 - Springer

4. Also in the introduction, it should be well justified why two sensors were used (Landsat 8 and Sentinel-2A), beyond the difference in spatial resolution.

5. It is suggested to combine Figures 1 and 2 so that a single map is presented. In addition, a legend explaining the symbology used should be added to this map.

6. The methodology should clearly explain that field data from the 2020-21 period will be used to validate the accuracy of the estimation equation. Although a cross-correlation analysis could also have been used as a validation strategy.

7. It is suggested to combine tables 2, 3, and 4 into one table.

8. In Figures 3 and 5, the same NDVI class ranges should be used for the two resulting Landsat 8 images. Similarly, the same NDVI class ranges should be used for the two resulting Sentinel-2A images. These class ranges should include one class with NDVI values less than 0.25 and another with values greater than 0.95, which may represent bare soil, settlements, water bodies, non-agricultural crops, or infrastructure. The images should also be elongated.

9. In the estimation of maize yield, only the average of the periods 2018-19 and 2019-20 was used because yield indicators such as maturity, density, vigour, or disease were not considered.

10. In Figure 4, the lines of the "x" (NDVI) and "y" (yield (t/ha)) axes should be illustrated with the corresponding numerical scale.

11. It is suggested that Table 6 be replaced by a figure illustrating the residuals (difference between actual yield and predicted yield) for both Landsat 8 and Sentinel-2A.

12. It is suggested to eliminate Table 7 and better comment on the results in the text, where it is clear that the use of Sentinel-2A images resulted in a lower error (8.82%), compared to Landsat 8 (10.15%). In this regard, the possible causes should be commented on, as it could be that Sentinel allows better detection of the density of maize crops.

13. A "discussion" section should be added where the results are compared with the similarities or differences in the results of other works on the estimation of maize yield based on NDVI.

14. The conclusions section does not refer to the presentation of a summary of the results but to pointing out what was obtained in relation to what was expected. In this sense, it may help to specify a hypothesis to be tested in the objectives of the work.