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

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Title: Yield Forecasting Model for Maize Using Satellite Multispectral Imagery Driven

Vegetation Indices

The major comments are as follows:

A. **Introduction**

During the 2011-12, total maize cultivation area and yield were 1, 97,000 ha (0.2 million) and 12, 98,109 (1.3 million) metric tons, respectively.

- Instead of yield it should be production.

The phonological growth of wheat has been monitored during the Rabi season of 2007-2008

- Instead of phonological it should be phenological

However, very few studies have been conducted on the relationship between high resolution (~ 30 m) Landsat 8 and Sentinel 2A (~ 10 m) satellite data and maize yield in Bangladesh.

- However, a large number of studies on Maize have been carried out elsewhere in the World. Authors should have referred such studies for better understanding the issues related to Maize area estimation and yield prediction using RS & GIS technology.

A. **Materials and Methods**

i. **Study Area:**

- Figure-1: location map is very difficult to understand, Instead of single band satellite image, it can be FCC of the study period with administrative boundaries. The names given on the image difficult to read. Even the Bangladesh map with

admin. Boundaries are too much cluttered and difficult to locate the study area.

- Maize cultivated during *Rabi* season in this study area and approximately 90% of this rainfall is concentrated between the months of May and October in the Kaharole upazila. So authors should discuss about whether maize is cultivated as rainfed crop or irrigated crop during the *Rabi* season. **This makes large difference in the yield levels of maize.**

i. **Yield data collection from farmer's fields**

- Figure-2: Map is not at all clear, the admin boundaries not at all seen. Location of Maize fields (red triangles) is absent.
- Also along with Maize plots, some plots of other crops grown during Rabi season should also have been located for studying crop separability.

i. **Landsat-8/OLI and Sentinel-2A /MSI Datasets**

- Total 6 images (Landsat: 3) and Sentinel-2: 3): It is not clear whether each season 6-images collected or total 6-iamges for three crop seasons. The table-1 indicates that basically it is single date satellite data analysis for each season.

i. **Satellite Image Pre-Processing**

- The details of atmospheric correction using dark object subtraction (DOS-1) should be discussed in detail. Its impact on changes in Radiance Or Reflectance values of different maize plots should be tabulated. If there are no significant improvements, then utility of this atmospheric correction should be discussed.
- The relationship between NDVI and maize growing period was established by plotting the respective values in terms of single days from the start date of maize plantation to harvesting period.

In this study, single date satellite data during the maize growing season was used. So based on single date NDVI values, how the relationship between NDVI and maize growing period was established needs detailed clarification.

- NDVI values less than 0.25 and more than 0.95 were removed. Whether this threshold was generated based on NDVI data analysis of entire image or only using NDVI of Maize plots needs to be clarified.
- Accuracy assessment of maize crop identification on both Satellite data should also discussed.

A. **Results and Discussion**

- Regression analysis of the NDVI values over the field locations

This section is very poorly drafted; very confusing and statistical analysis and its interpretation are difficult to understand.

For Landsat 8 data, NDVI distribution was the maximum during 2019-2020 and distribution was minimum during the season 2019-20 at Kaharole upazila. **This statement is very vague and what authors want to convey is not clear.**

- Table-2 and 3 indicates NDVI (Landsat & Sentinel-2) and Yield values of Maize for two seasons and mean NDVI (from Landsat and Sentinel-2) of two seasons is given in Table-4.

The basic scientific reasoning for this step is not clear. Instead of mean NDVI, the two season data (40 points) should have been used in regression analysis.

- Figure-3: Spatial distribution of NDVI: Along with these NDVI images, FCC image should be presented for better understanding the vegetation/Maize crop vigour in conjunction with NDVI values. **Figure-3 needs improvements, Legend font should be increased.**

Figure-4: Different coloured symbols on the trend line, what they indicate, are not clear.

Table 5: Regression parameter and R^2 for combined season at Farmers' maize field

In Table-5 and equation 3, the symbols β_0 and β_1 what they indicate, should be explained.

- Table-7 indicates actual mean yield of Kaharole, whereas the yields predicted using NDVI regression equation are base on the 20-farmrers fields**. The comparison of sample yields to total area of**Kaharole, is not valid.

The methodology adopted for extrapolation of avg. yields of 20 farmers field to Kaharole, needs to be explained.

A. **Conclusions**

The conclusions are very general; it should bring out the major results and also high light the limitations of this methodology for its application to larger areas with large variability in yield a swell as growth and vigour condition of maize.