CHARACTERIZATION OF DIFFERENT CROP TYPES USING BIOPHYSICAL INDICATORS DERIVED FROM SENTINEL-2 MSI MULTI-TEMPORAL DATA

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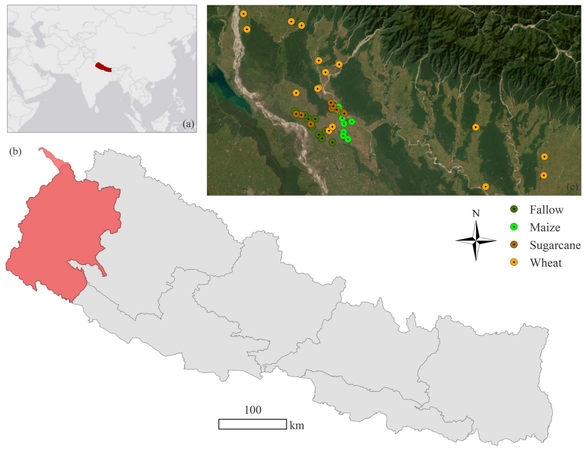
INTRODUCTION

- Crop monitoring plays a fundamental role to achieving SDG2 (zero hunger) and SDG15 (maintaining life on land) (Whitcraft et al., 2019).
- The vulnerability of South Asia and Nepal to natural disasters highlights the importance of obtaining consistent information on agricultural land use for effective disaster management and mitigation strategies (Atzberger, 2013).

OBJECTIVES

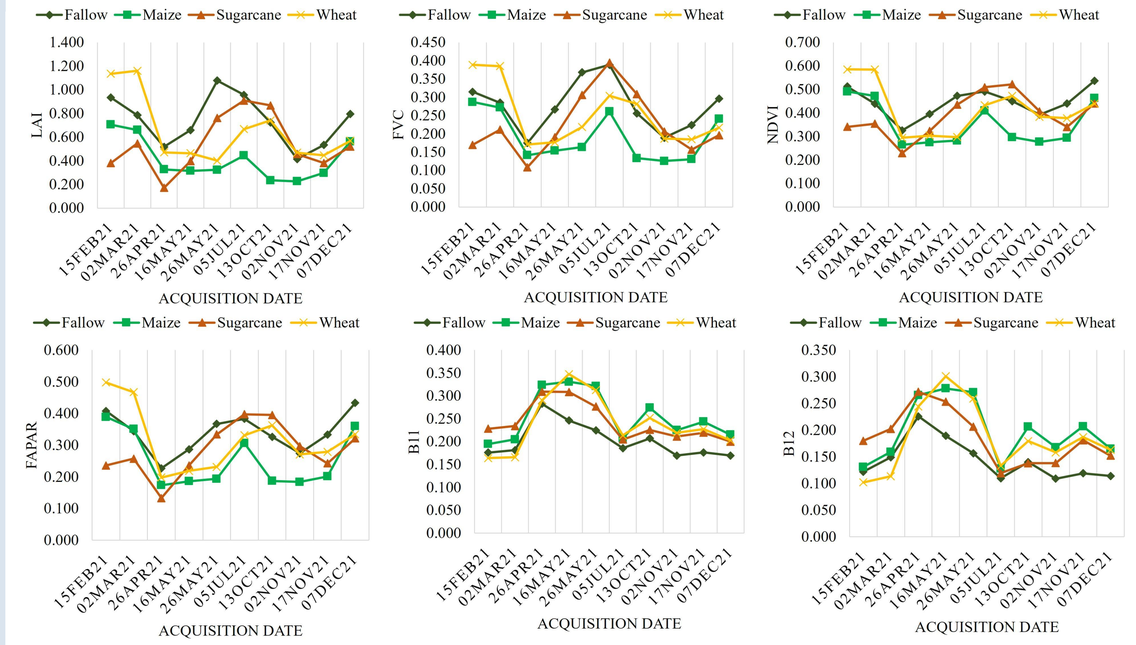
- Characterize the most cultivated crop types in Sudurpashchim Province (Nepal).
- Identify the temporal trend using Sentinel-2 MSI data.

STUDY AREA



Geographic location of the study area: (a) Locator map of Nepal, (b) Sudurpashchim Province, and (c) Sampling plots distribution.

A time-series analysis of Sentinel-2 MSI Data demonstrates the potential of using temporal patterns in biophysical indicators to identify crop types, revealing significant synchrony with crop calendars.

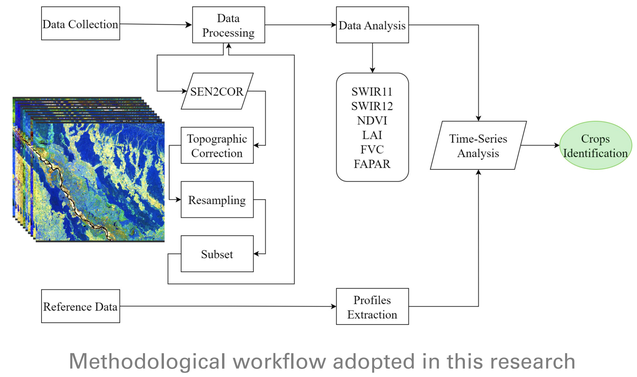


Temporal variation of biophysical indicators, NDVI and SWIR bands derived from Sentinel-2 MSI data.

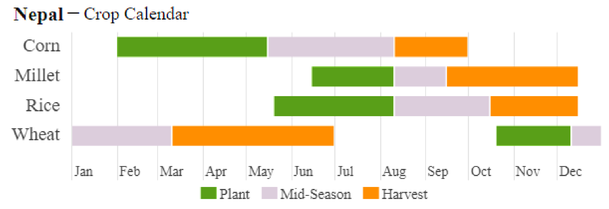
- **Wheat**: Max. values in Feb-Mar due to optimal weather and soil conditions for growth during this period, with sudden drop in the harvest season.
- **Sugarcane**: Peak values in Jul-Sep attributed to optimal weather conditions and longer daylight hours, which support maximum photosynthesis and plant growth.
- **Maize**: Peak values of LAI, FVC, NDVI, and FAPAR in July, as crops reaching maximum growth and biomass.
- **Fallow**: Monthly fluctuation with an increase in Apr-May due to organic matter build-up and vegetation regrowth, with a decrease in July attributed to reduced soil moisture.

MATERIALS & METHODS

- Ten Sentinel-2 MSI Level 1C products acquired between February and December 2021.
- Vector data of Nepal's 2nd level administrative borders.
- Field data on crop types acquired from the National Soil Science Research Center (NARC).
- Used software: ArcMap 10.3 & Sentinel Application Platform (SNAP).



Methodological workflow adopted in this research



Crop calendar for cereals in the main season in Nepal (IPAD, 2023)

CONCLUSIONS

- The efficiency of biophysical indicators in crop type identification during mid-season.
- The increasing and decreasing trends of remote sensing variables are relatively synchronous with crop calendars.
- Developing machine learning models to leverage biophysical indicators for cropland classification and yield estimation.

References

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